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PRACTICAL PATHOLOGY.

LECTURES

ON SOME SUBJECTS CONNECTED WITH

PRACTICAL PATHOLOGY AND SURGERY,

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BY

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PREFACE.

In the following work I have availed myself of MS. notes of lectures of Abernethy, Brodie, and Mayo, and have also had the advantage of considerable assistance from Dr. Marston, whose known accuracy of observation and soundness of judgment afford the best guarantee for the truthfulness of any scientific investigations in which he may engage.

The work has been revised, enlarged, and in great part re-written. It contains the substance of the second editions of two separate volumes, at present out of print, together with several lectures now published for the first time.

9, Savile Row, W.,
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DISEASES OF THE VEINS.

LECTURE I.

PURULENT INFECTION OR SUPPURATIVE FEVER.

A PATIENT, eight or ten days after an amputation say, is suddenly seized with a rigor more or less violent. This chill repeats itself one or more times a day for two or three days successively, and it is succeeded by fever and perspiration. Occurrences such as these always awaken grave forebodings in the mind of the surgeon: fears lest purulent infection may have taken place. If the patient present a dejected appearance, and show some cerebral symptoms of excitement and depression; if the respiration become hurried, and a yellowish or sub-icteric tint, with an increased temperature of the skin appear, and an alteration occur in the state of the wound, consisting in the discoloration, more or less complete, of the granulations and a diminution of the purulent discharge, there does not, unfortunately, any longer remain room for doubt. The patient is a prey to one of those terrible accidents which attend surgical practice, and too often defeat all the care and skill of the operator. The fate of the patient is commonly sealed, and his case adds another unit to the formidable number of lives sacrificed to pyæmia. You will see these cases unhappily in the surgical wards of most hospitals, and you will occasionally meet with examples of the same thing in private practice. You will find a disease, in all respects similar, among poor women confined in a lying-in hospital; and the richer classes, provided with all that affectionate solicitude can suggest, are not, under similar circumstances, entirely exempted from like occurrences.

Nor are these acute and formidable forms the only examples of purulent infection. There is, I think, every reason to believe that the hectic fever of the patient labouring under chronic suppuration is essentially a disease of the same character; purulent absorption is slowly taking place into his system, and the heat, fever, and sweating, as well as the attendant emaciation, are so many phenomena referable to a blood contamination. The slower course, and less pronounced symptoms of the malady are probably to be explained by the fact that the contamination of the blood in these cases is never far in advance of the eliminative action that it sets up. And you will, I doubt not, perceive that this self-same silent, secret work of absorption of diseased products into the blood plays a great *rôle* in the production of other trains of symptoms. The resorption of septic materials from the surface of an ulcerated or sloughing throat in scarlatina, or from the intestine disorganized by typhoid fever, may contaminate the blood in the neighbouring veins, lead to the formation of metastatic abscesses, and induce secondary forms of fever.

Several diseases have been grouped together and described under the name of pyæmia. Some of these are different in their origin, and probably not altogether allied in their pathology. But they all have a common tendency, sooner or later, to produce abscesses in different parts of the body.

These diseases must always have existed, but it is only of late years that their true pathology has been at all understood. Formerly they were described under the names of irritative, sympathetic, hectic, typhoid, or surgical fever. The prevailing notion seemed to be, that these disorders had a common origin, and that they differed from one another rather in their degrees of severity than in their pathological causes. On referring to some manuscript notes in my possession, of the surgical lectures delivered by Mr. Abernethy at St. Bartholomew's Hospital, during the winter of 1820-21, I find that he proceeds, after stating that local injury, disease, or irritation, may induce sympathetic fever, to detail the symptoms which characterize that complaint, taking as an illustration, the occurrences which may ensue in a patient who has sustained a compound fracture of the leg. "The nervous condition is," he says, "one of excitement and irritability. The patient sleeps but little, or if he do sleep, he wakes suddenly, and with a start, as if alarmed, becoming broad awake at once; he is alert and anxious, and has a *feeling* of strength and vigour. The sanguiferous system is excited, there is some feverishness, and *all* the symptoms indicate a want of secretion.

This goes on to a certain point, and then diminishes; it seems to have a period, and to terminate about the third day, when the wound begins to suppurate, and hence the fever was called by the older surgeons 'suppurative fever.' Examine this patient on or about the third or fourth day—after suppuration is established in the fractured limb—and note the change which has taken place. There is still perhaps excitement; the fever diminishes; the skin is less hot, and there is a disposition to sweat; the secretions are increased; the tongue is moist and clean; the nervous system is no longer vigilant; the patient feels disposed to sleep, and he awakes perspiring; he is languid, and has a feeling of weakness; his appetite returns. What is all this? The constitution is still disturbed by the local malady, but the disturbance has a different character; it is, in fact, the commencement of hectic fever." This is described by Abernethy as a *teazed* action of the system, endeavouring to throw off what annoys it: the cause being removed, it ceases at once. The predominant character of hectic fever is languor; the pulse is feeble and frequent; the patient has a disposition to sleep and to sweat profusely; the urine is copious and pale; the tongue clean; the digestive organs are disturbed; and he is afflicted with flatulence and a disposition to purging. As this fever advances, sweats break out, and towards the last, the stomach refuses to exercise its functions.

There are two kinds of hectic fever he says—the slow and the rapid. The violent disturbance such as described, "is the consequence of local injury, although these febrile affections may occur without any such injury. The description given by Cullen seems to have been taken from *pulmonary* hectic. In *surgical* hectic there is no regular exacerbation. If the cause were removed, the fever would cease. Many a man has a diseased knee removed, and when put to bed, sleeps as after a long watching, and the fever ceases completely."

"I now come," adds Mr. Abernethy, "to the last sad scene of all which may end this eventful history of a compound fracture. The patient may become more decidedly hectical; may get weaker and weaker; may have colliquative sweats, &c.; the blood hardly seems to circulate; the injured part also by a kind of unison which always exists between it and the general system, suffers a remarkable change; the discharge from the wound ceases; it becomes dry, tawny, yellowish or greenish; it is surrounded by an erysipelatous inflammation, and appears to have a tendency to slough. Yet the constitution suffers a change which no one would believe who had not seen it."

"A new kind of fever supervenes, the pulse becomes strong, full, and hard; the skin is hot and dry, with occasional sweatings; the urine is scanty and high coloured, the tongue is covered with a dark brown fur; there is a disposition to wandering of the intellect; subsultus of the muscles, nervous irritability, perhaps purging, and certainly a bad state of the bowels. Mr. Hunter called these symptoms of dissolution—if he mean symptoms which often precede death, well and good—but, if he mean that death invariably follows them, I cannot coincide with him, as I have often seen people recover from them. I call this fever Sympathetic Irritative Fever ; it is the last expiring effort of the constitution ; the symptoms are in reality those of Typhus Fever, and I will defy the most sagacious physician, previously uninformed of the state of the patient, to distinguish this from typhus ; in *it* there is violent action, with apparent want of strength (the same symptoms, however, sometimes *precede* hectic fever). The state of delirium is curious : the patients resemble those who are under the influence of a troubled dream—generally the character of their thoughts is mournful, but now and then they seem to be merry. When roused they give rational answers, but they soon relapse. One man, I remember, who always fancied he was on a journey, and he would throw his leg about as though nothing ailed it ; he was in the last stage of irritative fever, with sloughing of the leg."

"You cannot now rely upon stopping the progress of the disease by removing the cause, at least this fever does not suddenly subside, as hectic does, after the removal of the local irritation. I have seen cases where limbs have been removed, and the patients in this state have done well, but the surgeon must be neglectful who has allowed the case to go on to this stage ; he *must* have seen the vital powers sinking, and he should have amputated."

I cannot find in the remainder of the notes, which are very extensive, any further allusion to those forms of disease which we are accustomed to regard as pyæmic in their origin and character.

Up to the time of Virchow, the generality of surgeons admitted that the symptoms of purulent infection were due to the introduction of pus into the blood; and before the publication of my observations in 1852, in which I pointed out the differences between the lining membranes of veins and serous membranes under the action of irritants, and detailed my views regarding the formation and nature of the coagula in these vessels, inflammation of the lining membrane of the veins was considered a common disease, and the purulent form of it, in particular, was regarded alike as the cause of pyæmia, and the source of the pus cells supposed to be circulating in the blood.

Nearly all the observations which have tended to advance our knowledge of the effects of the introduction of diseased fluids into the blood, have been recorded in connection with the term phlebitis, and the points upon which the greatest amount of interest is still concentrated, are the relations subsisting between the phenomena of blood-clotting in an affected vein and phlebitis on the one hand, and on the other, those secondary multiple abscesses in the viscera, which are the frequent concomitants of wounds and injuries. It is foreign to my object, as well as beyond my power, to afford you a thorough explanation of all the different and allied phenomena included under the terms phlebitis, metastatic abscesses, pyæmia, and the like. It can scarcely be said that the pathology of these disorders has yet been thoroughly elucidated. If my aims be more restricted, they have, however, the advantage of being more practical. When symptoms of pyæmia have actually occurred, but little is to be hoped from therapeutics. I shall endeavour to fix your attention upon the grave and often fatal effects which follow lesions of the veins, with the view of discovering how far these are capable of being opposed by surgical art.

In discussing this subject a frequent reference to pyæmia cannot be avoided, for the veins probably form the ordinary channels through which morbid materials are conveyed into the circulation, and alterations in their contents commonly become the starting point of grave constitutional diseases allied to, if not identical with pyæmia. A brief survey of the doctrines advanced at various times by different observers cannot fail, therefore, of being a pertinent introduction to our subject.

We find, then, that three distinct affections have been described under the general name of phlebitis, viz., a primary inflammation of one of the larger veins of the body; the secondary affections, which occur in veins situated at a distance from the original lesion; and the general infection of the system, which results from the admixture of diseased secretions with the blood.

The symptoms which occasionally accompany or follow inflammation of a vein after bleeding, are of so marked a character that they must at all times have attracted the observation of surgeons, but it is not until comparatively recent times that they have been distinctly or separately described. The actual condition of the parts in persons and animals who had suffered after venesection, was first clearly described by Hunter. He found in several cases, both in men and animals, when fatal consequences had supervened, that the coats of the injured vein were inflamed and thickened, and that this inflammation extended for a considerable distance along the vessels.

In some cases these appearances were found to have reached even to the lining of the heart, but in the majority they appeared to have spread in an opposite direction.

Pieces of fibrin, adhering to the reddened lining membrane of a vein, were for a long time very naturally regarded as the product of its inflammation. The altered colour of the membrane is, however, commonly only a blood staining due to the imbibition of colouring matter from the neighbouring clot and no proof of inflammatory action ; and the adhesion of coagulated fibrin to a membrane against which it is apposed is, in itself, no proof of any organic or physiological union between them. Still, there is ample evidence for believing that portions of coagulated blood may coalesce with neighbouring parts, and become vascular and organized.

As illustrative of this, the clots in the serous sac of the arachnoid, and those in veins and arteries obliterated by ligature, may be mentioned. Mr. Prescott Hewett has admirably described the changes which ensue in blood-clots extravasated within the cavity of the arachnoid. These are at first attached to the parietal layer of that membrane, and afterwards become encysted and organized. Mr. Hewett has witnessed a clot acquire these characters, and become plentifully supplied with blood-vessels, twenty-three days after an injury. I shall have to speak of the organization of clots subsequently.

Hunter clearly described the process of suppuration in veins, and showed that a series of abscesses would frequently form in their course, and he came to the conclusion that the lining membrane of veins was liable to inflammation, which might terminate in abscess. These observations appeared to prove satisfactorily that the cause of the severe symptoms occasionally observed after bleeding, was to be attributed to an affection, often accompanied by, if not dependent upon, inflammation of the veins.

Ambrose Paré, Morgagni, and other pathologists, also observed and described with greater or less accuracy the formation, anomalous as it appeared to them, of abscesses in the liver, and of tubercles (indurations) in the lungs, after injuries to other parts. Much ingenious reasoning was used to account for the formation of these hepatic abscesses. Those of the lungs attracted less attention, and when noticed, were probably mistaken for vomicæ. Cases sometimes occurred, however, which could not be accounted for by any of the then existing theories.

Multiple abscesses were recognised in other parts of the body, but still without any distinct idea of the way in which they were formed.

Hunter's attention appears to have been directed in an especial manner to abscesses in the lungs, and to the condition of the veins in their immediate neighbourhood; yet he has left us no hint that he ever entertained the idea, that the appearances which he there observed, could be in any way connected with an alteration of the blood caused by the entrance of a morbid product into the vessels from a wound. He appears to have believed, that the injurious consequences of inflammation of the larger veins were to be attributed to the propagation of the inflammation in an uninterrupted course along the lining membrane of the vessels, and especially its extension to the heart.

In this notion he was followed by nearly all the writers upon the subject, until Mr. Arnott proved by a careful collection of cases, that the signs of inflammation and irritation were by no means generally to be found, either in the heart or in the large veins connected with it. Still, the idea of irritation being propagated in some undefined way along the lining membrane of the veins, was by most surgeons held to be sufficient to account for the severe symptoms, which in many cases accompanied or followed slight injuries to veins, such as that made in bleeding.

MM. Dance, Cruveilhier, Castelnau, and Ducrest at length entered into a long series of investigations, which terminated by establishing in the fullest manner, a connection between the inflammation of a part originally injured and the secondary abscesses observed in internal organs. It only remained to ascertain with precision, the way in which these abscesses were formed, and the circumstances which determined their formation in some localities in preference to others. In the dissections performed by Hunter, he found that the blood was almost always coagulated in inflamed veins, and he concluded that by this means the contents of the veins were cut off and separated from the general circulation. It occasionally happened that the coagula were not present, and then Mr. Hunter believed that if purulent matter formed in the vein, it might become mixed with the blood, and be carried in the general course of the circulation. This opinion of Hunter's probably gave rise to the idea, long maintained and ably supported, that pus might be taken up from one part of the body and deposited in substance and in the same condition as it was absorbed in another. MM. Dance, Cruveilhier, and Sedillot have all in succession maintained this view of the mode of formation of secondary abscesses by metastasis. This theory, however, of the arrest of pus-cells in the capillaries of the lungs or liver, not only cannot be proved, but there is much evidence against it. The great similarity in size and appearance between white blood-corpuscles and pus-cells, would prevent our distinguishing them; and it is improbable that the former, on account of their size alone, could be transmitted through channels in which the latter are arrested. The theory is altogether too mechanical to account for the various facts associated with the occurrence of secondary inflammations; and that pus from a chronic abscess may circulate with the blood without producing any such results, was proved by a Committee of the Physiological Society of Edinburgh in 1852.

M. Cruveilhier's observations, as expressed in his "Traité d'Anatomie Pathologique Générale," went to establish the occurrence of a suppurative phlebitis in the vicinity of a wound, as the origin of those secondary metastatic abscesses, with which all pathologists were at that time acquainted. Cruveilhier conceived, when inflammation of a vein took place, that the action might never—and, ordinarily, did never—pass the limits of adhesion; but that a suppurative phlebitis sometimes ensued, and then, that the pus either became mixed with the current of the blood, or isolated and shut off from it by being confined and included within a blood-clot. As long as the pus remained so localised, he thought that it might determine a local inflammation and discharge itself by an abscess at the part; but if the barriers opposed by the blood-clots became broken down, the pus would then gain an entrance into the circulation, and the pus-globules, on being carried to the capillaries of the viscera, might excite a capillary phlebitis, and circumscribed inflammations and suppurations of the neighbouring parts. Cruveilhier therefore concluded, that the visceral abscesses discovered in pyæmia and its allies, are the result of a secondary capillary phlebitis excited by the presence of pus-cells derived from a primary phlebitis in a vein or venous capillary. The experiments which he made, by injecting quicksilver into the circulation of animals, apparently afforded a strong support to his theory. He was enabled to produce visceral abscesses in a dog, into the medullary canal of whose femur he had inserted some quicksilver. Minute particles of the mercury were carried to the pulmonary capillaries, there arrested, and the globules became the separate centres of so many circumscribed inflammations and abscesses.* Now, it was no objection whatever (as Tessier urged) that these visceral abscesses might sometimes be found after surgical injuries, in which either no phlebitis at all was discoverable, or wherein the pus, if present, was confined by blood-clots; because, first, every vein in the body must be examined before we can decide upon the non-existence of phlebitis ; and secondly, Cruveilhier conceived the barriers opposed by the clots to the transference of the pus to be only temporary, tending to break down and pass away ; or the pus-cells might, he thought, permeate a thin porous clot by a capillary filtration, and so gain an entrance into the circulating current. Cruveilhier further supported his idea, by showing in cases of multiple visceral abscesses occurring after amputation where no phlebitis was discoverable by dissection of the soft parts, that upon further examination pus might often be found in the medullary cavity and spongy textures of the bones. This highly ingenious theory has not withstood the test of later investigations. It is open to many objections, the main one being the erroneous description of the production, constitution, and composition of the blood-clots, which Cruveilhier perceived were the almost invariable attendants on his phlebitis. The appearance of pus-cells circulating in the blood may have been in reality due to an absolute or relative increase in the number of white blood-cells. An increase of these white cells is not a peculiar symptom of pyæmia, but is a character of the blood, common to many diseases attended by depression and wasting, particularly where there exists any attendant irritation of the lymphatic glands.

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* If mercury be shaken with freshly drawn blood, its particles will soon be found to be firmly adherent to small portions of decolorised fibrin. The same result would take place in the living body, and it is therefore highly probable that the mercury became arrested in Cruveilhier's experiments in the lungs of animals, not because the tubes were too minute to allow it to pass, but because the particles of mercury and of fibrin had adhered together.

The origin, constitution, and composition of the clots found in veins have proved a fruitful source of discussion and discrepancy of opinion among pathologists.

Mr. Hunter regarded the puriform products found in veins as ordinary pus, derived from a suppurative inflammation of the lining membrane; but M. Cruveilhier discovered that there was a coagulation of the blood, and this he thought the initial step in all inflammatory processes; and he found that the supposed purulent fluid always occupied the centre of the coagulum, and not that part of it in connection with the lining membrane of the vessel in which it was contained. Now, clotting of the blood in a vein may exist, and very often does exist, without any evidence of phlebitis at all, and conversely, a phlebitis may exist without any such coagulation. No one has yet satisfactorily demonstrated the *presence of an inflammation limited to the lining membrane of a vein.* My own observations, published in the year 1852, in vol. xxxv. of the "Medical and Chirurgical Transactions," substantiated the fact, that the lining membrane of veins does not comport itself under the effects of irritants in the same manner as the other serous membranes do, and that local irritants show their effects first upon the blood itself, and not upon the lining membrane of the vessels. Virchow, as we shall see, discards the primary and secondary phlebitis of Cruveilhier as non-essential phenomena, and starts with the formation of, and the subsequent changes in, a coagulum or thrombus.

The fact of these purulent-looking deposits occupying the centre and not the circumference of a clot, is rather an evidence of their origin in the elements of that clot, than of their being produced from the internal coat of the vein. Cruveilhier had to account for the presence of the puriform material, by the hypothesis that the pus-cells permeated to the interior of the clot by capillarity. But there was another and fundamental error, which arose from the assumption that such puriform matters were identical with ordinary pus. Had this been the case, then indeed, the clots or polypi containing puriform-looking fluid in their centres so often found in the right side of the heart, ought to have been an indication of a pre-existing pyæmia ; yet it did not escape the observation of pathologists that such was not the case.

In reality, the cells resembling pus-cells are pre-existing elements, and not the product of any inflammatory action. The microscopic appearances are those of the white blood-cells, the shrivelled and altered remains of the red corpuscles, and the molecular *débris* of the fibrin-mesh, in which these were suspended. A clot undergoes those retrograde changes to which all bodies capable of organization are liable, when removed from the sphere of the vital forces. Thus, a coagulum of dead fibrin, kept for a while at a temperature of 100°, becomes so softened and altered as to attain a puriform appearance. Professor Gulliver, in his lectures "On the Blood of Vertebrata," has traced and illustrated these changes very accurately. As the *centre* of every clot is the farthest removed from the tissues through which an organic union could take place, so do we find that *there* the retrograde and degenerate changes are earliest in point of time, and most marked in degree. The process is one of liquefactive degeneration of the fibrin of the blood-clot, setting free its cellular constituents. To borrow Virchow's lucid illustration : "It is with this process just as when water which is thoroughly impregnated with solid particles is frozen and then exposed to a higher temperature. When the ice melts the enclosed particles must, of course, again come to light."

The only mode by which a clot can remain *in situ*, without undergoing these retrograde changes, is through its becoming organically incorporated with the neighbouring tissues. In many instances, where the coagulation has been progressive and not immediate throughout the whole clot, this process will be found to bear the evidences of having commenced at the outside first, on the lining membrane of the vein; and afterwards to have received additional deposits or layers; for the coagulum will be found externally composed of fibrin, firm and free from blood globules, while towards the interior of the vessel, it is soft, loose, dark, of a mottled aspect, with numerous blood globules, like an ordinary blood clot. We can scarcely avoid perceiving in these differences of appearance the evidences of a different method of production, the first being a process of fibrinous deposition, the latter a clotting, in which all the constituents of the blood are involved.

As has been said already, phlebitis has an undoubted existence. When some external injury has been applied, to a varicose vein for example, and pain, heat, tenderness, and swelling follow, the symptoms leave little doubt of the presence of inflammation, and a coagulation of the blood at the part injured is the effect; but then the inflammation appears to have been propagated from without inwards. The vein is enlarged, the coats are unnaturally distended and vascular, and they may even be separated from one another by effused serum, lymph, or pus. The internal coat may be found thickened, opaque, and covered with an adherent blood-clot. The vessel may become patulous, and gape on section. Any one who has examined an injured and inflamed pile, may have witnessed the formation of a coagulum in connection with inflammation; but, it may be urged, the coagulation often appears to precede any of the local signs of inflammation, and the relation of one to the other then becomes a very difficult question to determine. Now, it really appears, that the phlebitis is sometimes the cause, sometimes the consequence of the clot—the former probably, when the vein is diseased or has sustained any mechanical injury; the latter, when some irritating substance has been introduced into the blood capable of causing its coagulation.

The coagulation that is the effect of a phlebitis, seems to be occasioned by some morbid impression made upon the blood through the lining membrane. The clots which are found firmly adherent to one side only of an artery or vein, are generally connected with a diseased condition of the vessel at that part, and are the result of some localized irritation. Although it is undoubted that the internal coat is not liable to be inflamed in the same way as serous membranes are, there is no reason why it should not be affected with a perverted nutrition allied to a state of inflammation. Being non-vascular and composed of very delicate epithelial cells supported on a fine substratum of connective tissue, we cannot expect to find the phenomena identical with those in inflamed vascular tissues. Changes in the structure and contents of the cells, marked by a cloudiness or opacity of the epithelial layer, and the production of very fine elementary growths in the connective tissue, here take the part of the lymph and false membrane, which are the results of an inflammation of the peritoneum or pleura. The researches of Mr. Lister and others, sufficiently indicate what very slight deviations from the normal relations between the membrane and the contained blood, may lead to a coagulation of the latter.

In phlegmasia alba dolens, for example, the obstruction of the circulation generally results from the influence upon the blood, of materials absorbed through the uterine veins. At one extremity the venous clot is multiple, adherent, and composed of root-like processes, extending into the tributary branches; the opposite extremity lying free in a large vein, and terminating by a large rounded end. The marks of phlebitis are rarely present. If the clot be of a simple kind, it will generally liquefy and become so thoroughly disintegrated as to disappear, without leaving any trace of its existence, and without having induced any constitutional symptoms. But it sometimes happens that portions of the coagulum are detached and arrested in the heart or large pulmonary trunks, producing fatal forms of cardiac or pulmonary emboli. If several small portions are detached, or the *débris* of the clot be carried away by the current of blood, the particles become arrested in the smaller pulmonary vessels, and give rise to obstructions, local œdema, or a form of pneumonia of a less active and dangerous form than where the pulmonary emboli are formed of decomposing or putrefactive matters.

It is owing to Virchow in particular, that the morbid phenomena belonging to the pyæmial group of diseases have been so acutely analysed of late years, and he has attempted a reconstruction of their pathology.

Discarding the term phlebitis altogether, and laying hold of one of the main phenomena—the coagulation or clotting of the blood—he has followed out from this stand-point all the subsequent and remote effects to which it may give rise. He has made this the thread, by which he traces the continuity and relation of all the subsequent links in the chain of morbid phenomena. Virchow admits neither phlebitis nor the transport of purulent globules by the veins in pyæmia. His explanation of the increase of the white globules in the blood is as follows:—

In purulent infection, there nearly always exists an erysipelas, an adenitis, or an enlargement of the spleen. In all these cases the functions of the spleen and lymphatic ganglia are exaggerated, which results in the formation of a great abundance of white globules.

The fibrin of the blood coagulates in a vein, and thrombosis is the result. The coagulum, or thrombus, increases insensibly in length, extending itself until it reaches a vein of larger calibre, into which it protrudes like a bud. The coagulum does not suppurate; the appearances which gave rise to this idea being susceptible of another explanation. The extremity of a thrombus advancing into the larger vein, is being continually bathed by the venous current. Its surface becomes disintegrated and its substance gets carried away atom by atom. These reach the lungs; the smaller portions are not, however, detained there, but pass to the left heart, and onwards to the arterial capillaries, where they accumulate, and obstruct some of the smaller vessels. The consequence is, that the corresponding tissues are deprived of life, if the collateral branches do not speedily establish the circulation. It is in this way that Virchow explains the formation of metastatic abscesses by embolism.

In the preceding sketch, we have mainly directed our attention to those forms of constitutional affection which take their origin in connection with a wounded, suppurating, or inflamed part; but the term pyæmia, practically includes cases in which the symptoms of systemic infection are present from the first onset of the disorder. When, for example, a patient in other respects influenced by predisposing causes, has been exposed to the action of some mineral poison, or when a woman who has been recently delivered has been exposed to the erysipelatous or scarlatinal poison, there is probably systemic infection from the first, out of which these secondary affections may or may not arise. The symptoms are those of a typhoid form of fever, and the disease may progress so rapidly, that death may take place before the ordinary anatomical expressions of the disease have had time to manifest themselves. In other cases again, the number, extent, or gravity of the local lesions, quite fail to account for the fatal issue. Neither coagula in the veins, emboli in the smaller arteries or capillaries, nor abscesses in the structural textures of organs are discoverable. We do not yet know on what the fluidity of the blood depends, and we cannot say why, at one time, the impression made upon it by an animal poison should cause its coagulation, and at other times fail of doing so. But I think we are warranted in concluding, that the liability to, or the actual occurrence of coagula in these disorders, results from one of three conditions, viz.:—1. Some injury or morbid alteration of the coats of a vessel. 2. The introduction of some diseased product or foreign material into the circulation. And, lastly, from the impression made upon the blood by the action of an animal poison. When secondary affections result from the two first of these, they will show themselves in the capillaries of the organ nearest in the course of the circulation to the place of the primary affection, or to that where the materials gained their entrance. When secondary affections are the result of the last, however, they may appear anywhere.

This seems to me to meet an objection to the embolic theory, viz., that it does not explain those cases where the lungs had escaped, whilst other organs were affected, although the capillaries of the former should, according to the course of the circulation, have been first blocked. Because a patient with a wound or suppurating disorder exhibits symptoms of pyæmia, it does not necessarily follow, however, that these should have been connected, although no doubt this is commonly the case.

LECTURE II.

PHLEBITIS.

PATHOLOGY.—When any morbid matter passes into the veins, there is but one means by which it can be prevented from entering the general circulation, and that is by the obstruction of the vessels in which it is contained. The method adopted by nature in order to produce this obstruction is, under ordinary circumstances, the coagulation of the blood. In the absorbent system of vessels, morbid matters are arrested in their course towards the circulation in a different way. Every absorbent vessel conveys its contents in the first instance to a lymphatic gland, where the fluid undergoes a kind of digestion, which fits it for being received into the blood, or when such a conversion is found impossible, the morbid matter is expelled from the system by suppuration. When inflammation of a lymphatic vessel has arisen—be it a simple or a specific inflammation—the diseased action always pursues a course towards the gland, or to the group of glands "first in order," and there it generally terminates; those "second in order" very rarely indeed being affected. If the absorption of vitiated fluids from a wound continue, then the noxious matter may accumulate in the lymphatic ramifications and give rise to pustules or abscesses "wherever it filters over the vast area of skin subordinate to the obstructed glands." "The inflammation and suppuration of the glands appear also to be eliminative as regards the afferent lymphatics, and the injured distal parts, and protective as regards the circulating blood."* When symptoms of pyæmia ensue in such cases, it seems probable, that some of the same morbid materials that caused the disease of the lymphatics, have gained an entrance into the veins directly, and not through the intermediate channel of the lymphatics. It is only in very rare instances indeed, that the infection of the blood arises from a diseased gland by the passage of matters along the efferent lymph tubes.

The number of vitiated fluids which may traverse the veins without leaving any trace of their course, is probably great; but there are some which leave evident indications of their passage towards the general circulation. With the latter class we are principally concerned in relation to phlebitis. These morbid agents may practically be divided into two classes.

I. Those which, on admixture with the blood, determine its coagulation.

II. Those which, upon admixture with the blood, produce its decomposition.

I. *Coagulation of the blood in a vein* may be either a primary or secondary affection; it may be either the cause or effect of the inflammation of the coats of the vein. In the one case the coagulation is determined by a diseased condition of the blood, quite independent of the state of the vessels in which it is contained; in the other, it is produced by some impression conveyed through the coats of the vessels. The gravity of the symptoms will depend upon the conveyance, and still more perhaps, upon the nature of the matters conveyed from the diseased part into the circulation. The local symptoms therefore need bear no direct proportion to the constitutional affection. From whatever cause phlebitis may arise, whether from the nature of the morbid contents, from mechanical injury, or from the extension of inflammation from surrounding parts, the evidence of that inflammation is in the cellular coat of the vein, and, to a less degree, in the circular fibrous coat. No one has yet succeeded in producing unequivocal marks of inflammation of the lining membrane only of a vein.

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* *Vide* Article on Absorbents, by Mr. C. H. Moore, in vol. iii of Holmes' Surgery.

In *acute* phlebitis the cellular coat is preternaturally vascular, presenting a red appearance of greater or less intensity. It becomes at the same time distended with inflammatory products. These consist of serum, lymph, and pus, according to the kind of inflammation, either separately or mixed together in different proportions. Fluids secreted on the outer surface of a vein readily extend along it, permeating the areolar tissue which connects it with surrounding parts. This may be particularly noticed where a vein is surrounded by a sheath, as is the case with the jugular. The circular fibrous coat also becomes injected, and thickened by deposit. The inner coat soon loses its natural transparency, and becomes wrinkled and even fissured. It is of a dull, opaque, dirty white colour, stained more or less by the contents of the vein. It will consequently, in different cases, assume every hue of red, violet, or brown; the intensity of the colour following very accurately that of the coagulum in contact with it.

Exudation often occurs between the inner and the outer coats, and the different layers of the former then become disintegrated, or the lining membrane may be cast off in large portions into the interior of the vessel. All the coats of the vein may, under these circumstances, be easily detached from each other, or may be separated by serous, fibrinous, or puriform exudation. When these form under the lining membrane, they may be seen as patches of various sizes and shapes through the transparent structure, so long as this retains its integrity. Afterwards they may be poured, together with the fragments of the disintegrated membrane, into the cavity of the vessel. The inflammatory exudation between the different coats of the vein destroys its natural pliability, so that when divided it will remain open like an artery.

The coats of veins, when mechanically injured, would appear to be as little susceptible of inflammation as any structures in the body. The same vessel may be opened several times in succession, and, provided it be properly closed after each operation, no inconvenience will result. The way in which veterinary surgeons unite the edges of veins after bleeding, by means of a pin and twisted ligature, shows the amount of injury which these vessels will bear with impunity, and the same point is frequently illustrated in the present day by the operation of dividing large veins for the cure of varicose ulcers. These remarks apply to instances in which the veins are mechanically injured only; the case is widely different when any irritating fluid has entered their cavities. The amount of disturbance which is then produced, apparently with the object of getting rid of the noxious element, offers the strongest contrast to the simple process of union, by which the coats of the vessels are repaired after injury. The internal surface of veins, reacts upon the application of extraneous matter as quickly and extensively as the serous membranes of the body, yet, in order that this effect may be produced, it is necessary that the morbid matter should be maintained for a certain period in contact with the lining membrane, which cannot be the case as long as the circulation of the blood through the vessels is continued.

When irritating substances are introduced into the veins, they must expend their injurious influence either upon parts with which they first come in contact, or upon some more distant vessels, or upon the system generally. If the morbid matter causes coagulation of the blood in the vessel into which it is first introduced, and the coagulum be maintained there, a local disease only is produced, and the constitution is spared. To effect this, is in many cases obviously the design of nature. But in this, as in every other remedial action, the object may be carried out more or less perfectly. The original intention may not quite succeed. The deleterious agent may be temporarily retained by a clot, which afterwards disintegrates and is conveyed elsewhere. The morbid matter will then produce disease of the part to which it is conveyed. It matters little in what part of the circulating system it may be arrested. The essential character of the disease will be the same in any case, and the same morbid alterations will take place in the stagnant blood. The so-called primary and secondary phlebitis are, therefore, essentially the same disease; the latter being so much more dangerous in its results on account of the greater importance of the organs usually attacked, and on account of the general mass of the blood having usually become more or less infected. In both instances, the altered condition of the contents, rather than of the coats of the vessel, being the principal and main phenomenon. We have to deal with fragments of coagula in a more or less altered condition, and according as this alteration has assumed this or that character, the nature of the processes which arise in consequence of the obstruction, may also be very different. For example, a metastatic deposit derived from the original site of a coagulum undergoing a gangrenous softening, will also assume a gangrenous character, just as would be the case if gangrenous matter were inoculated.

When the blood coagulates in one of the larger veins on the surface of the body, the affection is recognized by the cord-like induration of the vessel. There is at first no swelling, or tenderness of the limb, and no constitutional irritation. The subsequent changes depend very much upon the nature of the coagulum which has formed. If this be composed of healthy blood, such as may be produced by introducing a needle connected with the negative pole of an electric battery, or by passing a ligature round a vein, then, when the original cause of the obstruction is removed, the coagulum will slowly dissolve, and be carried in the course of the circulation. There will generally be but little local, and no constitutional disturbance, and the circulation through the vein will become completely restored. In a few cases, the coagulum, instead of becoming dissolved, will remain and obstruct the vessel to a greater or less extent. Other changes will then supervene. The coagulum will lose its colouring matter, and become tunnelled by numerous channels of blood, or it will remain in unorganized, perhaps concentric layers, moulded to the shape of the contracted vessel for an indefinite period. Sometimes it will become organized, but this will seldom happen so as permanently to obstruct the passage. If the coagulum be small, it may be attached to one side only of the vessel, to which it will become so intimately connected that, after a certain time, it will be impossible to distinguish the inner lining of the vessel from the inner surface of the newly organized substance. If the coagulum be large, the outer layers will be firm, and sometimes organized. Coagula will often assume the form of dark blood-stained masses, adhering to the lining membrane of the veins for a considerable distance. The more fluid parts generally disappear, being probably carried in the course of the circulation, and the passage through the vein is re-established. The venous channel may then be lined on one side, or on every side, by the newly-formed membrane. In the earlier periods of these formations, the layers of fibrin may be peeled off the inner coat of the vein, but subsequently they become inseparable from it.

When an artery is ligatured, the base of the internal coagulum comes into contact with the outer coat and the lymph effused around the internal and middle coats divided by the ligature. During the subsequent stages, vessels extend from these parts into the clot, and organic union ensues; but the circumstances are different in the case of a vein. It is difficult in this case to account for the way in which a coagulum may become united to adjacent parts, and whence the vessels are derived which pass from one to the other. It is probable that they are formed in the coagulum itself, and are subsequently met by others, which shoot out from the adjacent parts to inosculate with them. This idea is in accordance with that which is known to take place in the original organization of parts in the embryo. During the process now described there may be little or no thickening of the parietes of the vein, and little constitutional disturbance.

When the coagulum is composed of vitiated blood, it will, however, become a source of irritation, and its presence will give rise to the symptoms of acute inflammation of the vein in which it is contained. The parts of the venous system in which stagnation of vitiated blood is most likely to take place, are those connected with the part originally injured, for here any vitiated fluid acts with the greatest intensity; and here also, probably some of the veins have been mechanically injured, and therefore offer a mechanical impediment to the circulation. For this reason, when any of the larger veins of a limb have been interfered with, the distal veins become distended, and are liable to be injuriously influenced. We have thus the solution of the fact observed by Hunter, but not explained either by him or by subsequent writers, viz., the tendency that inflammation of a vein so frequently manifests to spread in a course opposite to that of the circulation. The next most frequent situation for the stagnation of vitiated blood, is in the smaller vessels of parts at a distance from the original seat of injury. The different currents of blood, uniting in returning to the heart, increase the velocity of the stream, and it seldom happens that any obstruction occurs when a forcible motion of the blood is maintained; but as soon as it is separated again into small portions, and its motion becomes retarded in the vascular channels, portions removed from the original clot get impacted, or the tendency to coagulate may again come into operation. The mechanical obstruction of a small vessel by the introduction of minute fragments of a clot, or of corpuscles which have caused the deposition of fibrin around them from the blood, induces a state of blockade, and the circulation has to be provided for by the collateral channels. Serous effusion may be produced either by venous obstruction, or simply by a diminished rate of circulation, and the same may be said of arterial obstruction, as illustrated by the œdema which follows the plugging of an artery; or the obstruction and retarded circulation together may give rise, according to their degree, to a serous or coagulable exudation. This accounts for those dark patches of congestion frequently observed in the skin, and in the structure of internal parts. The purely mechanical view, however, of accounting for *all* these secondary obstructions appears imperfect.

In the skin we may sometimes observe the process by which these secondary congestions are formed. A circular patch will assume a livid hue, and every point will be equally affected. The blood in each capillary branch will become stagnant, while the surrounding skin will retain its natural appearance. It seems unreasonable to suppose that all the vessels in the affected portions of skin should be obstructed by minute portions of the original clot, and that none of these should have passed into the unaffected parts of the skin. Such an action can only be accounted for by the coagulation of the blood in the part.

Should the coagulum consist of irritating fluids in conjunction with the blood, inflammation will take place in the immediate neighbourhood of the obstructed vessels. Lymph will be deposited, and will add to the induration which previously existed, and the circulation through the part will be still further obstructed. At this stage of the disease it is not at all uncommon for portions of the affected part to mortify; when the skin is affected this is probably the most frequent termination. In the lungs, which are supplied with blood from both sides of the heart, mortification is less seldom observed, and in the spleen and liver it scarcely ever takes place, but the structure of these organs becomes broken down in a manner which much more resembles the effects of decomposition or softening than of inflammation.

Should the part not pass into a state of mortification, then, the following changes generally occur: the centre of the indurated mass becomes softened and converted into a puriform fluid. This fluid is often of a dirty-brown colour, as though some blood or small portion of the organ had decomposed in it. It is not contained, like an abscess, in a distinct cyst, but surrounded by a purple induration, caused by the effused lymph mixed with the stagnant blood. By degrees all the affected portions lose their consistency and become broken down. The softening takes place from the centre towards the circumference of each discoloured spot, till they become converted into so many distinct abscesses.

II. *Decomposition of Blood in Living Vessels.*—There can be no doubt that the blood is often veritably poisoned by the introduction of putrid and decomposing materials, and that it is to this state of the blood that the morbid phenomena witnessed in many cases of pyæmia are mainly due. The symptoms which follow the injection of putrid fluids are altogether more severe, rapid, and diffused than those which follow the injection of fluids containing solid particles. The phenomena of coagulation and embolism may be present or not; but the blood is so vitiated that it is no longer fitted for the nutrition of the tissues; the interchanges which should take place between them no longer ensue, and the circulation through the capillaries consequently becomes arrested.

Decomposition may take place while the blood is yet in the living body. If once commenced it may rapidly be communicated either by contact, or by the removal of the decomposing blood or its clots, to a distant part of the circulation. If a very small piece of cotton wadding, for instance, be soaked in a putrid fluid, and introduced into a vein, in 24 hours the blood, for many inches up the vein, will have formed a dark gelatinous clot, which if left will soon pass through the various stages of putrefaction. This action will be generally accompanied by inflammation of the vessel in which the decomposing blood is contained. The surrounding parts will then become involved, and the whole will form, if the action be sufficiently long continued, a putrid abscess. The following experiments of M. Gaspard indicate how readily the results of decomposition may be conveyed from one part of the body to another.

Experiment.—"Two ounces and a half of thick fetid fluid, derived from the maceration of cabbage leaves in an equal quantity of water for two days, at a temperature of 77° Fah., were injected into the right jugular vein of a moderate sized dog. During the operation the animal became faint, and vomited several times. Some hours afterwards, there was a great uneasiness and oppression, with recurrence of the vomiting, and continued faintness during the day. After nine hours a most copious and very fetid evacuation took place. The discharge was as black as soot, and composed of mucus, with a little fæcal matter, and a large quantity of what appeared to be corrupted blood. Some time afterwards there was a second evacuation of bloody mucus, exactly resembling the first. On the following day there was much loss of strength—the animal lay upon its side, or staggered as it walked. There was great and insatiable thirst, with a small, feverish pulse; but the most remarkable symptom was the occurrence, at intervals, of palpitation of the heart, accompanied by great increase of impulse and sound. On the third and fourth days the animal was better, but there was still great thirst, fever, and occasional rejection of fluids from the stomach. On the fifth day the symptoms became aggravated. There were extreme weakness, a tottering gait, excessive thirst, the eyes red, and filled with gum; the nostrils were stuffed, swollen, and obstructed with mucus, and the lining membrane of the mouth was tumid, and of a violet-red colour. In the middle of the day there was a liquid greyish-white evacuation, resembling pus in its odour, consistence, and appearance, mixed with some clots of putrefied blood. Death occurred during the following night.

Post-mortem appearances : The mucous membrane of the eyes, nose, and mouth was red or violet, and covered by a very abundant thick mucus. The lungs were of a dark colour, with some black patches, but still crepitant. The left ventricle of the heart presented several brown stains, resembling ecchymoses, which penetrated into its tissue. Its internal surface was of the colour of lees of wine, offering a singular contrast to that of the right side, which contained a hard fibrinous concretion, two drachms and a half in weight, of a light yellow colour, and resembling grease in appearance. This was of the same consistence throughout, and everywhere free, with the exception of a portion of the size of a finger nail, which adhered to the inner surface of the ventricle. No appearance of the injected fluid could be recognized in this clot. It was continued, of the same colour and consistence, into the pulmonary artery, and into the vena cava, the vena azygos, the axillary, and even the right jugular vein.

The intestinal mucous membrane, especially of the rectum, duodenum, and a portion of the small intestines, was of a violet-red colour. It was inflamed in longitudinal stripes, and in patches, which gave a mottled appearance, even to the outer surface of the intestines before they were opened. This discolouration was not accompanied by any thickening of the tissues, nor by ulceration, and appeared to be the result of ecchymosis or hæmorrhage. The lining membrane of the rectum was principally affected, and its mucous glands were swollen and very prominent. This intestine contained matters resembling those evacuated before death. The other intestines contained a very thick greyish-white mucus. The mesenteric glands were enlarged. The gall-bladder contained black, thick, ropy bile, resembling melted tar."

Experiment.—"An ounce of putrid water, in which some beef had been macerated, was injected into the crural artery of a middling-sized dog. The artery having been tied, the pulse ceased below the tendo Achillis. A considerable degree of fever and restlessness followed the operation. This continued the whole day and the following night, without any of the vomiting or evacuations which so commonly followed similar operations upon the veins. The next day the limb was very painful, but not swollen. There was thirst with the ordinary secretion of fæces and urine. On the third day the animal was evidently better; the appetite had become almost natural, and he could walk more easily, although the limb still appeared very painful. In the night there were some soft, almost liquid evacuations. The fourth day the animal was evidently recovering, when an ounce and a half of very fetid and very concentrated fluid (derived from the maceration of beef) was injected into the crural artery of the opposite limb. The animal immediately evinced pain, accompanied by very violent and remarkable palpitation of the heart. It walked lame, keeping the leg raised, and soon became feverish and uneasy. The symptoms were exactly the same as after the first experiment. The leg became gradually more and more painful, and extremely sensitive, but not infiltrated with serum. During the night there was much expression of pain, and the animal was in continued motion. Death occurred nineteen hours after the second injection. The limb had become swollen only within five or six hours previous to death. Post-mortem appearances: The limb presented a very large quantity of bloody fluid infiltrated in all the tissues. The superficial muscles were black, and presented more or less the appearances of gangrene. The deep muscles were entirely disorganized, and converted into a putrid pulp, resembling masses of the red lees of wine, extremely fetid, and disengaging a quantity of gas. The limb first injected was still swollen, and presented, in the interior of the adductor muscles, two or three cavities filled with a putrid bloody serum. In the chest the lungs were healthy, as were also the right cavities of the heart, but the left cavities presented several reddish-black spots, scattered over their external surface. In the left auricle was a firm, yellowish-white coagulum, adhering to an inflamed spot on its inner surface. The intestinal canal was filled with a brownish-red fluid, resembling altered blood, which in the stomach and duodenum was of the colour of soot. The mucous membrane of these organs, as well as of the jejunum and rectum, was gorged with blood of the colour of the lees of red wine, but without any inflammatory thickening of their coats."

Another experiment performed by Gaspard, sufficiently illustrates the fact that the blood is really poisoned by the introduction of putrid matters. He extracted some blood from the jugular vein of a dog, which had died from the effects of a putrid injection. Although this fluid was defibrinated and filtered, and was without any sign of putridity, its introduction into the jugular vein of a healthy vigorous dog gave rise to symptoms of blood-poisoning ; the animal was attacked with vomiting and purging, but eventually recovered.

When, through the introduction of a septic agent, the stagnant blood begins to decompose, the whole of its constituents are then together involved in the changes which take place. An interval however, even in the most strongly marked cases of natural disease, usually elapses between the introduction of the infecting cause, and the manifestation of constitutional symptoms. This is especially the case where diseased secretions enter the circulation through the nutrient vessels of bone.

The cancellous structure of bone may be compared to the cellular tissue of soft parts. When inflamed, its interstices become filled up by the effused products, and an abscess may be as accurately circumscribed in the hard as in the soft structures of the body ; but where the inflammation is not circumscribed by adhesion, the secretions may permeate from cell to cell in non-adhering parts. In soft structures, a remedy is at hand for allowing the escape of matter, by a free division of the parts, but in bone, the hard unyielding sides offer an effectual obstruction to the escape of any effused fluid. An unhealthy inflammation is propagated along the endosteal membrane; the cells of the bone become infiltrated with inflammatory products, the sinuses and small veins become closed with coagula, and if these coagula break up, there is nothing to prevent the diseased products from finding their way into the general circulation. The morbid matter is detained for a certain time, during which the process of decomposition is established. The dissolved and putrefying fibrin, in its course towards the centre of the circulation, will loosely coagulate fresh portions of blood, and then determine their decomposition. The contaminated blood may then be found in the vessels in every stage of decomposition, or it may have passed out of the vessels in which these changes have taken place, having first stained them of a deep livid colour. Long tracks of purple veins will occasionally be found, some being blocked up with viscid blood in various stages of putrescence, and some comparatively empty, having discharged their contents.

The frequency with which symptoms of pyæmia follow injuries to, or operations upon bone is well known. The organisation of bone, and the comparative slowness with which remedial actions are carried on in it, render it peculiarly liable to interruptions in the process of repair, especially when, as not unfrequently happens, the vitality of some portions of its substance with their peri- and endosteal membranes has been threatened. The offensive smell of the bone, as well as the appearance of its cancellous structure infiltrated with unhealthy lymph and puriform matter, will frequently show in such cases, that the reparative processes have not followed their natural course.

It becomes a question well worthy of solution, whether these results are as common after amputations through a joint, as through the shaft of bone. Some observations by the French military surgeons, Dr. Valette, M. Jules Roux, and Baron Larrey, are well calculated to draw attention to the matter.

M. Jules Roux read a memoir before the Imperial Academy of Medicine at Paris, in 1860, which gave rise to very interesting and protracted discussions, in which Baron Larrey took a principal part. After adverting to the great fatality attending amputations of the thigh for gun-shot wounds, during the Crimean and Italian campaigns, and the excessive mortality attending secondary amputation generally after such injuries, he proceeded to describe—under the name of osteo-myelitis—an extremely common affection following gun-shot wounds of bone. He states that this osteo-myelitis involves the whole length of the bone, and points out how any amputation in continuity will not only fail to remove the whole of the mischief, but will aggravate its severity, by the additional stimulus of the saw. He recommends therefore, that disarticulation should invariably be adapted, instead of amputation in continuity, in secondary amputations for gun-shot wounds. Of twenty-one such disarticulations recorded by him (including four at the hip joint) not one was fatal.

These observations obviously possess great practical interest. M. Roux's conclusions are, however, of too sweeping a character. The mortality attending amputations on the battle field may be accounted for by other causes. Professor Longmore, in a paper on this subject read before the Royal Medico-Chirurgical Society, February 20th, 1865, has shown that in several cases, where the morbid state of the tissues was manifestly due to the continued osteo-myelitic action after amputation for gun-shot fracture, the diseased action did not traverse the whole extent of the bone; the necrosis was limited and failed to reach the epiphyses, and the sequestra were encased by copious shells of new bone as in ordinary cases of necrosis. Cases of diffuse inflammation of bone, allied to erysipelas or acute cellulitis of soft parts, have occurred within my own experience, and I have published a coloured plate representing the disease extending throughout the whole of the tibia in vol. xvi of the Pathological Transactions. It is probable that such cases are of more common occurrence than is generally believed, particularly after crushing injuries to large surfaces of bone, or where there has been some shock to the part, out of all proportion to the amount of appreciable injury.

When the fluid fibrin introduced into the vessels has attained a very great degree of putridity, the tendency in the blood to coagulate will not be sufficient to resist its circulation through the general system.

The following experiment, illustrative of this point, was performed for me by Mr. Mayer, veterinary surgeon. A young and perfectly healthy ass was secured and the right jugular vein exposed. An ounce of fluid, derived from the spontaneous decomposition of portions of fibrin, and in a very advanced state of putrefaction, was mixed with an equal quantity of water, and injected into the exposed vein. The vessel did not become "corded," and the circulation was not apparently impeded. In a few moments the animal gave three or four groans, expressive of much distress. The vital powers appeared at the same time to be suddenly prostrated, the animal was unable to rise, and soon fell into a state of syncope. The faintness lasted for a few minutes; on getting up, the animal reeled, and staggered about for some time, and then recovered sufficiently to walk to his stall. Some reaction now commenced, the breathing was disturbed, short, and quick, the pulse 120 in the minute, small and wiry. These symptoms continued for about an hour and a-half, when the animal became very restless and uneasy, evincing internal pain by groaning and looking at his side. All food and water were refused, and death followed four hours after the operation.

On a post-mortem inspection sixteen hours after death, the jugular vein, into which the putrid fluid had been injected, was found in its natural condition, partially distended with fluid blood. It was pervious through its entire length, and contained no coagula. The lungs were studded with irregularly circumscribed, soft, black patches. When cut into, these discharged a black fluid, having the appearance of a mixture of blood and ink, and of a strong putrid smell. The heart had liquid blood in both its cavities. The cœcum, colon, and a portion of the small intestines, were deeply congested and of a dark livid colour. There was an effusion of many pints of serum into the peritoneal cavity; this, as well as the blood throughout the body, had a putrid and very unpleasant smell. In this case the putrid injection either prevented the coagulation of the blood in the body, both before and after death, or had the effect (in the event of any coagula having been formed) of determining their speedy reconversion into a fluid state. These effects are very different from those observed after the injection of simple, unirritating substances, or from those which follow the translation of pieces of fibrin or blood-clot. These latter may plug the vessels of internal organs and become encapsulated by the thickening walls of the vessels, and the formation of an envelope of connective tissue; or they may lead to anæmic softening, and localised suppurations of the surrounding parts. But the decompositions set up by putrid fluids lead to inflammatory irritations of a rapid and destructive character: wide-spread infiltrations, inflammatory softenings, or limited gangrene, without the production of any embolic abscesses.

LECTURE III.

PHLEBITIS (*continued*).

THE general result of the introduction of putrid fluids into the system, whether directly into the circulation, or into a serous cavity is, to produce a remarkable affection, characterised by a peculiar congestion of the mucous membrane of the stomach and intestines. The vitiated material or animal poison is determined to the muco-enteric tract, much in the same way that a mineral poison is, when inserted through a wound. The evacuations accompanying this condition are evidently an effort of nature to relieve the system from the vitiated fluids which have entered the circulation, and it is not a little remarkable that the mucous membrane, and none of the other coats of the intestines, should be affected in these cases. The appearances produced, may be distinguished from the results of common inflammation, in that there is no thickening or shrinking of the tissues, but they are swollen, congested, and blood-stained, either in petechial spots, in larger patches, or over a continuous surface. The discharge from the intestines in such cases consists chiefly of mucus, but this may sometimes be accompanied by a kind of passive hæmorrhage, and occasionally the secretion may assume a puriform character, without any abrasion of the mucous lining of the canal.

It may now readily be understood that the appearances and symptoms, which a few years ago were so often observed and described as forming a separate disease, under the name of *gastro-enteritis*, may frequently have been only secondary results produced by an unhealthy condition of the blood.

When the actions produced by the introduction of putrid fluids into the body are fully developed, all the indications of putrefaction may take place, even in the living body. Not only the fluids, but the so-called solids pass rapidly into decomposition, and the former would appear, in addition to being extremely liable to decomposition themselves, to have the property of infecting other parts, and even other healthy individuals. Thus we read, that during the plague of Marseilles, the bile taken from those who had died of the disease, uniformly produced death when injected into the veins of dogs.

After a putrid element has been introduced into the system the blood is evidently altered in composition. It becomes black, viscid, and in a great measure deprived of its coagulating power. After death it is found fluid, of a very dark colour, and not unfrequently mixed with gas.

The long-continued congestion of the mucous membrane, as of other parts, has a tendency to terminate in the softening of the tissues involved. This is the case whether the congestion is of healthy or diseased blood, but the tendency is much more marked, and occurs much more rapidly, in the latter case than in the former. The congestion of comparatively healthy blood in the legs of old people is often a cause of consequent softening and breaking down of the tissues. A molecular necrosis occurs unattended with any great amount of inflammation.

In the treatment of affections arising from the presence of a septic poison in the system, it is important to remember that the alimentary excretions afford a natural method of relief. The determination of this class of poisons is evidently to the mucous membrane of the intestines, and every facility should be given for its elimination in that way.

The post-mortem appearances in the more solid structures of the body, in those who die in consequence of the introduction of vitiated fluids into the blood, often cannot be distinguished from similar changes produced by other causes, yet there are some effects which are peculiar, and may be directly associated with the reception of foreign matter into the circulation. The most characteristic circumstance, attending the extension of disease to different organs of the body through the medium of the blood, is that several parts of these organs, or even different organs, will be simultaneously attacked. The disease will appear at once, in various spots, which will become rapidly disorganised, while the surrounding textures will remain unaltered, either in structure or colour. The appearances observed upon dissection will vary according to the part attacked; and the stage of development in which the disease is found.

The lungs are the organs in which the successive changes may be most frequently observed. The morbid processes affecting these organs are, perhaps, the most important and interesting, not only on account of their frequency and gravity, but because we can trace in them the type and pattern of those diseased conditions elsewhere seated. The first appearance produced in the structure of the lungs, is that of one or more congested or dilated veins of very small diameter. This will be followed by a well defined spot, of much darker colour than the surrounding texture. Several of these spots will probably appear at the same time, and each will soon become surrounded by a spherical patch of purple congestion. Effusion of lymph will now take place, commencing in the centre of each affected portion, and gradually extending towards its circumference. If the disease continue, each spot will suppurate, and the different parts will become softened and broken down, in the same order in which they were previously solidified.

In the slighter degree of the affection, as we view the surface of the lung through the pleura, particularly about the edges of the lobes, it is found to be variously mottled and blood-stained. Numerous spots of congestion, blotches, or purpuric-looking dottings are discovered, forming separate foci, as it were, of disease. On cutting into these, the quantity of air is found to be diminished: a dirty-coloured fluid exudes, and we may perhaps discover the blood coagulated in one or more twigs of the pulmonary vessels.

In another and more advanced stage, these separate centres of diseased action have become the seats of effused products; they are hepatised, and no longer crepitate on pressure. Softening or ulceration ensues, and the organ becomes the seat of multiple abscesses, like small vomicæ, with or without surrounding induration.

The serous covering may or may not be implicated. The surface over a diseased spot of lung may be covered with a freshly effused soft lymph, which may conceal the lobular disease beneath. The marks of pleuritis are sometimes much more extensive and general, consisting of diffluent lymph and sero-purulent effusion. This inflammation is occasionally excited by the close proximity of pulmonary abscesses, or by their rupture and communication with the pleural sac.

The initial step in these morbid changes must be sought for in the altered condition of the blood contained in the vessels, and not in the presence of a phlebitis, and when the lung is no more affected than in the first variety, we can often discover coagula or emboli in the smaller vessels, which themselves present no evidence of disease.

Turning to *the heart*, which is, however, far less frequently affected, we discover that the morbid processes are essentially the same. In pyæmial carditis, small secondary abscesses may sometimes be found affecting the cardiac structure immediately beneath its investing membrane. The surface of the organ also occasionally presents numerous ecchymotic or purpuric looking spots and blotches. Although the lymph may be general over the pericardium, as in the pleura, yet the cardiac muscle will generally be found diseased in isolated spots, with intervening portions of healthy structure. If the lymph be scraped off the pericardium, these spots will appear as small elevated opacities, which when cut into, are found to be minute cavities with softened edges, and filled with a puriform fluid, or a pultaceous material.

The liver frequently becomes the seat of secondary inflammation. In the early stage, brownish-red spots may be observed scattered through its substance.

These, as they extend, assume a bluish or slate-colour, and the structure of the liver thus affected is found to have lost its consistence, and to be very easily broken down by pressure. Every part affected here, as in the lungs, proceeds rapidly to softening and suppuration; and the usual appearance presented after death is that of several small circumscribed abscesses, around which the structure of the liver has been little, if at all, condensed. It sometimes happens that the larger veins in the liver become affected. These vessels being held open by the firm structure of the part, are not so readily obliterated as in other situations; and it happens that the fibrin of the blood being more or less perfectly separated from its other constituents is found in detached masses mixed with fresh portions of blood, which have not undergone the same change: a very peculiar mottled appearance, resembling granite, is thus occasionally produced.

Affections of the *spleen*, produced by the introduction of foreign matters into the blood, are probably not so readily recognized as similar affections in the lungs and liver. For, although the spleen is often found to be diseased in those who die from infection of the blood, yet it is comparatively seldom that secondary abscesses have been found in it.

Deposits of lymph, of small extent and of a light colour, are sometimes met with in the *kidneys*. The patches of congestion, so characteristic of this disease in other organs, are not here observed. This may depend upon the peculiar disposition of the capillary system of the kidney. The blood has to pass through the malpighian tufts, and may be altered in character before it reaches the proper venous system of the organ.

In cases where purulent infection of the blood has been purposely produced, portions of the kidney will not unfrequently be found inflamed and firmer than natural; but if the origin of the disease were not known, these appearances could not always be distinguished from those produced by inflammation from other causes. In a case where a fibrinous concretion had formed in the left side of the heart, and had afterwards become disintegrated, I found the kidneys to contain numerous masses of white deposit in various stages of softening.

The skin is liable to be affected in three different forms. The first of these occurs very rarely, and consists of small deposits of matter in the structure, or upon the surface of the skin, resembling in many respects the pustules of small-pox. The second is also of rare occurrence, and consists of small congested spots on the surface of the skin. These are generally of a dark purple hue, but sometimes they assume a bright red colour. The third form presents itself much more frequently than either of the others, although it has not hitherto much attracted the attention of pathologists in connection with purulent or other infection of the blood. It commences very suddenly, and sometimes without any particular attention having been directed to the part. A large circular patch of congestion, livid or purple in the centre, but becoming of a lighter colour towards the circumference, will form usually upon some part of the lower extremities. The skin of the calf of the leg, is perhaps more frequently attacked than that of any other part. In the centre of the congested portion, mortification very rapidly takes place, and is indicated by the part assuming a black or dull leaden colour. In some cases, it would be difficult to say where the mortification ceases and the congestion begins, but in other instances, there is a distinct line of demarcation formed; a zone of bright red congestion will then occasionally surround the mortified part.

Some modifications of this third form of skin affection may be met with occasionally in the course of the disease. Blotches, assuming a livid or dusky-red appearance, which gradually fades into the colour of the surrounding skin, will present themselves in different parts, and terminate in thick exfoliation of the cuticle, or in small sloughs of the skin. In some instances the superficial portions only are destroyed, and the parts beneath appear comparatively unaffected; small circumscribed portions of the outer layer of the skin will exfoliate, and the subjacent parts will heal without suppuration, by a process similar to that of scabbing.

The following case serves to illustrate the kind of skin affection which sometimes ensues, and it also shews that the morbid actions which generally result in a contamination of the blood of the whole system may be confined in great part, if not entirely, to a particular set of vessels. The post-mortem examination was made thirty-six hours after death.

S. W., æt. 33, died on the 12th of February, 1867, having been subject for several weeks to great irritation of the stomach and intestines, which was succeeded by jaundice, loose dark-coloured stools, sweating, and symptoms of purulent infection.

External Marks.—On the front of the chest and extremities there were numerous red, ineffaceable, petechial spots. On the back, the spots were of a dark livid hue. The skin of the neck presented a diffused redness, closely resembling scarlatinal rash.

Abdomen.—The cœcum, about the situation of its appendix, and the right extremity of the omentum, were found to be closely adherent to the abdominal parietes, the adherent portions being of a very dark colour. On opening the intestine at this part, it was found to be ulcerated and thickened, and the appendix was traced with difficulty from its being embedded in a mass of tissue in a semi-gangrenous condition. A small clot of half-putrid blood, with some decomposing and highly fetid fæces were discovered on slitting up what appeared to be the vermiform appendix. Upon opening the *superior mesenteric vein*, it was found to contain some blood clots. In some places these clots were so intimately adherent to the coats of the vein, and had been so hollowed out into a tunnelled form by the blood circulating through their interior, that the adhering fibrin looked like the lining membrane, but it was easily peeled off, and the epithelial coat below was found to be unaltered. As the epithelium presented the usual microscopical appearances, it was evident that the condition of the vein itself was not the cause of the coagula. The fibrin was a deposit from the blood in the part, and not the product of a diseased lining membrane. In some places where the tunnelling was less complete, portions of decomposing blood clot still remained, with a fluid exactly resembling pus. *The liver*, which was large and discoloured, was next examined, and found to be full of small abscesses, from the size of a millet seed to that of a walnut. These metastatic abscesses, which must have been some hundreds in number, were in most intimate connection with the various branches of the portal veins, spreading out from them like leaves from the twigs of a tree. The portal veins were laid open, and the main divisions to the right and left lobes contained decomposing clots with a quantity of pus, or a fluid like it to all appearance. The blood in the smaller branches was in a similar state, and here and there, one of these small vessels appeared as a long white streak lying parallel to the section. The lobules, at the least affected parts, were surrounded by a dark ring of congestion which contrasted with the white interior of the lobule. These abscesses had no limitary membrane, but were in fact, composed of the disintegrated elements of the necrosed hepatic tissue. *No abscesses* existed in the *lungs* or *other organs* (except in a few of the mesenteric glands), the liver apparently having acted as an effectual filter in preventing the passage of the decomposed elements into the general circulation.

When the *muscular structure* is affected, suppuration takes place with great rapidity; portions of muscles may be found quite soft, and sometimes pultaceous, in circumscribed patches, around which the fibre is perfectly healthy. Pus is occasionally deposited on the exterior of muscles, and it will be then smeared over the surface, and rather infiltrated in the cellular tissue, than contained in a cyst. In the interior of muscles there is the same absence of the natural limit to the inflammation ; but owing to the more compact structure of the part, the deposits of matter generally remain circumscribed.

The *serous membranes* are peculiarly liable to be attacked by secondary inflammation, and when affected, suppurate with the greatest readiness. They generally exhibit but a slight degree of vascularity, and sometimes appear scarcely more injected than in their natural condition. In the peritoneal cavity, large quantities of unorganized lymph are frequently poured out, mixed with turbid serum or pus. The synovial membranes of joints, when affected, often appear to run directly into suppuration, and become distended with pus in a very short space of time. The pleura on the other hand will seldom suppurate at first, but lymph will be deposited upon its surface, and its cavity will contain turbid serum, occasionally mixed with blood.

SYMPTOMS.—Sometimes, after an injury to a vein has been followed by the formation of coagula, symptoms of exhaustion, almost amounting to collapse, set in with all suddenness. The patient struggles and gasps for breath, while his features become remarkably anxious and pallid, without any appearance of venous discoloration. The pulse is small and intermitting; the skin cold, and covered with a clammy perspiration, and the muscular strength gone. The heart's action is a loud, ringing, irregular "wobble." Sometimes muscular spasms of a convulsive character are present. These symptoms denote that some coagula have reached the right side of the heart and even passed into its large vessels. This cardiac form of apnæa, as Dr. Richardson has well remarked, is due to the non-transmission of the blood to the air, and not to any impediment to the ingress of air to the blood. In Mr. Freer's case, recorded by Mr. Hodgson, these occurrences followed four hours after the saphena major vein had been tied for varices ; and, in another case, described by Dr. Druitt, similar symptoms followed the translation of a clot, from a vein in the thigh to the right side of the heart. Several other cases have been recorded at different times.

The commencement of constitutional disease, after direct infection of the blood, is marked by the sudden change in the manner and appearance of the patient. A severe rigor is usually the most prominent symptom, and is followed by much febrile excitement, or by extreme depression. A very peculiar heat of skin will sometimes be present, while at other times the surface will be covered by a profuse clammy perspiration. The fever is irregularly intermittent or remittent in type, in the cases characterized by numerous blood clots and metastatic abscesses. Evening exacerbations are also commonly present.* In cases of septicæmia, where a general infection of the blood exists, without necessarily any connection with blood-clotting, embolism, or multiple abscesses, the range of the pulse and temperature is very much higher, and the fever more continuous in type.

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* The febrile phenomena follow very much the development and evolution of the secondary deposits; a distinct rigor, or a well-marked febrile exacerbation being excited and associated with each centre of development. According to Dr. S. Ringer, there are ranges of temperature which are peculiar to cases of pyæmia, in that, when the fever is intermittent during the day, the temperature between the hours of elevation is normal.

Great depression frequently accompanies even the first stages of this disease, indicated by a want of tone in the pulse, by the appearance of marked dejection, and sometimes by a tendency to syncope. The countenance becomes anxious, the tongue dry and brown in the centre, and red at the edges, or, in other instances, it presents a coating of a pasty, yellowish-white colour; a dusky yellow hue frequently pervades the skin, and sometimes the conjunctivæ of the eyes. The pulse varies much in frequency in different cases, and at different times in the same case; generally it is very rapid, especially when there is much heat of skin. Sometimes there is severe pain, which may be referred exactly to the spot that subsequent examination shows to have been the seat of secondary inflammation; at other times it is not confined to any particular situation, but consists of general ill-defined feelings of short duration, and recurring at irregular intervals. The peculiarity of such sensations is best expressed by the terms applied to them by the patients themselves, "catching pains all over," "soreness of the stomach," and "thrilling in the blood," &c. When the respiratory organs are attacked, there is generally a peculiar feeling of oppression in the chest, associated with some difficulty of breathing; and the breath in pyæmia often has a curious and characteristic odour.

Vomiting may occur, either as a symptom of constitutional disturbance, or as indicative of inflammation of an abdominal organ. In the latter case it is extremely obstinate, and the fluid ejected is generally of a green colour. Diarrhœa is a symptom of frequent occurrence. Its appearance will not unfrequently be accompanied by relief of the other symptoms. When it occurs it is generally profuse, and little under the control of medicine.

The intellect is seldom affected during the first stages of the complaint, but subsequently, in severe cases, restlessness, delirium, and coma seldom fail to succeed each other. Death is commonly due to exhaustion in the cases of pyæmial fever attended with extensive suppuration ; but in other instances, it may be a direct result of the action of a poisoned blood.

These symptoms are all peculiar, both in regard to the rapidity with which they make their appearance, and also the sudden manner in which they occasionally disappear. When this infection of the blood arises in surgical practice, the accession of constitutional phenomena is often manifested from two to six days after surgical operations or injuries. When one of the large veins has been originally affected, the interval which elapses is comparatively short. In cases occurring after childbirth, it is usually longer, extending to the end of the second week. After surgical operations, or accidents involving some portion of bone, the access of the disease may be marked by a rigor during the third or fourth week.

The local phenomena which precede and accompany the constitutional malady are sometimes very indicative of a septic change. A wound, for example, ceases to appear healthy ; the surrounding tissues become inflamed, the healthy secretions of pus and lymph cease—the part dries up, and this is succeeded by an ichorous discharge. Sometimes an erythematous blush appears about the edges, and rapidly spreads over the skin of the part, or over that of nearly the whole body. Occasionally the areolar tissue becomes boggy and œdematous, or even emphysematous, from the development of gases arising out of a decomposition of the fluids. At this stage, the decomposition originating in a local action, may infect the general mass of the blood and rapidly kill the patient, without the occurrence of any blood clotting ; or coagula may form in the vessels, disintegrate, and decompose, and become conveyed to other parts. In the last instance, the phenomena of thrombosis and afterwards of embolism become superadded to the original septicæmia.

LECTURE IV.

TREATMENT OF PHLEBITIS.

I HAVE so far endeavoured to indicate the true pathology of phlebitis, and we have seen that many and essentially different processes have been included within this term. Phenomena which *may* follow a phlebitis, properly so called, may equally ensue where there has been no such inflammatory affection.

That those morbid conditions of the system in which there is a tendency to the production of lesions of many and distant parts, with multiple centres of inflammation, are intimately connected with a poisoned state of the blood, caused by the introduction of some septic or decomposing agent into the circulation, there can be little doubt; and I think we are warranted by the facts in affirming that they very often take their origin from a coagulation of the blood at some definite point. The effects on the system will no doubt be proportionate to the amount and energy of the morbid agent introduced into it, as well as the rate at which it is introduced.

The phenomena which follow the injection of a purulent or decomposing organic substance into a vein, are capable of being arranged into two different series:—1. Those *mechanical* changes which arise from the coagulation of the blood at the part, the breaking up of such coagulum, and the transference of portions thereof to distant parts, producing, what are termed by Virchow, respectively, thrombosis and embolism. 2. Those more general and subtle alterations in the character of the blood-fluid, which, whatever may be their exact nature, render it quite unfit for the nutrition of the tissues. It will be obvious that these need not be conjoined or concomitant effects. The first may be alone observed; but in the majority of instances, perhaps, where the second has an existence, it has been preceded and is accompanied by the former condition.

The treatment naturally, then, divides itself into local and constitutional, both as regards the primary lesion and the subsequent affections. Whatever tends to favour the healthy healing of a wounded vein may be regarded as affording security against any subsequent disease; and the chief point in the local treatment is, to prevent any accidental circumstances from interfering with the natural process of repair. When the powers of the constitution are enfeebled, even the natural motions of a part may interfere with recovery, and rest sometimes becomes an important object in the treatment. How necessary this is after childbirth, when the divided veins are being closed, every one who has attended such cases practically knows. Again, after bleeding, the arm will inflame in a much greater proportion of cases when the patient is obliged to follow his usual occupation, or when, from accidental circumstances, the arms are kept in motion. I have seen the symptoms of purulent deposits set in on the day following prolonged attempts to bring fractured portions of bone into position. In all such cases, any external violence or even the motion of the body, may loosen the coagula formed either between the wounded edges, or in the cavities of veins.

If the description which I have given of the morbid phenomena in veins be the correct one, the distinction between the process by which fibrin or fibrinous coagula are deposited from the blood, and that by which lymph is secreted from a living membrane, is of primary importance, not only in regard to the pathology of this class of diseases, but also with regard to their surgical treatment. No surgical interference could arrest a morbid process which extends by continuity of action in the lining membrane of a vein; but such interference is both indicated and warranted if the occasional and more severe symptoms of phlebitis are caused by the transmission of the contents of the vessel, generally in a more or less coagulated state. Indeed such attempts have not been entirely wanting.

Hunter remarks that when inflammation takes place beyond the orifice of a vein so as to alarm the surgeon, he should immediately make a compress upon the vein at the inflamed part, to make the two sides adhere together; or if suppuration has taken place, then the compress should be put upon that part of the vein just above the suppuration.* Now, as lymph is not effused in the early stages of phlebitis as a secretion from the lining membrane of the veins, the adhesion produced by Mr. Hunter's method of treatment would be by coagulum of blood only.

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* "Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge," p. 29.

This would not, under ordinary circumstances, become organized. It would adhere only to the sides of the vessel, and it would be constantly liable to become displaced. Such a bond of union, although it might prevent, for a time, the morbid contents of a vein from entering the general circulation, could scarcely be looked upon as a permanent union of the sides of the vessel.

In cases where the affected vein is seated superficially, a much more certain and effectual way of closing its canal, and of barring the entrance of its contents from the general circulation, may be used. This method, which, when properly performed, I believe to be free from danger, was adopted in three out of four of the following cases. The fourth case is given as an illustration of Mr. Hunter's method of treatment. It will, I think, be admitted that although Mr. Hunter's method might perhaps have been successfully adopted in the first case, it could not have been well used with any reasonable chance of success in the second and third cases.

Case I.—William Linsell, æt. 44, was admitted into St. George's Hospital on the 14th of September, 1864. A month previously he had cut the fore finger of the left hand. The part festered, in consequence as he believed of the cut having been poisoned. On the 12th of September the inflammation was extending up the arm, and on the following day he had severe rigors. Upon his admission there was some general redness over the lower and outer side of the fore arm. An irregular, unhealthy, and honeycombed wound, surrounded by thickened white skin, existed on the index finger. The course of some absorbent vessels could be traced on the outside of the arm by delicate red lines in the skin. On the inside a darker and deep blush extended in the course of the basilic vein to the middle of the fore arm. Beneath this the vein could be traced by the touch as a thickened cord. Two needles were now introduced beneath and across the vein, immediately above the point to which the inflammation had extended. A piece of thick plaster was applied in the course of the vessel over the skin, and retained tolerably firmly in its position by two elastic india-rubber bands, placed over the extremities of the needles. The vein was thus closed by acupressure at two points, about three-quarters of an inch apart. Between these points the vein was divided by subcutaneous section.

On the day after the operation the inflammation of the skin, and the thickening of the vein, extended as high as the part where the operation was performed, and there terminated abruptly.

September 17th—third day after operation. The inflammation had not extended beyond the divided portion of the vein. The needles were removed. Subsequently to this, two abscesses formed in the fore arm; one directly in the course of the basilic vein, and from this a quantity of brown matter was discharged, containing a large admixture of altered blood. No further local or constitutional disturbance followed in this case, and the patient left the hospital quite well on the 30th of September.

Case II.—William Kintleton, æt. 38, was admitted into St. George's Hospital on the 23rd of September, 1863, for hemorrhage from the internal saphena, which had burst at the lower part of the thigh. The parts around the opening of the vein were much thickened, so that its course could not be clearly distinguished. On the 24th of September an attempt was made to obliterate the saphena vein above the point at which it had given way. Two needles were introduced across the vein, and it was supposed to be divided between the needles. From the amount of blood lost on withdrawing them on the 28th, it became apparent that one of the needles at least had transfixed the saphena vein.

On the 30th two distinct and severe rigors occurred. The pulse rose to 146, and inflammation was extending up the thigh in the course of the saphena vein. A portion of this vein, not involved in any surrounding thickening, and about four inches above the seat of the former operation, was now selected, and a fresh needle was here passed fairly under the vessel. Pressure was made upon the vein by a figure of 8 ligature passed over the ends of the needle.

On the following day the pulse had sunk to 100. The local inflammation had increased; but all the constitutional symptoms had diminished in a marked degree.

October 2nd, pulse 92.

Within the next few days two abscesses formed in the saphena vein—one below, and the other above the point of insertion of the last needle.

On the 8th, the last formed abscess above the needle was opened.

13th, pulse 100, soft, compressible; had slept well. His countenance free from anxiety.

17th. The needle was removed, 17 days after its application. This patient was kept under observation until 5th of November, when he was discharged well, having had no recurrence of his symptoms.

CASE III.—John Brood, æt. 67, was admitted into St. George's Hospital on the 8th of January, 1862, for the purpose of having a very large cluster of veins on the inner and lower part of the thigh obliterated. The internal saphena was very much enlarged from the knee to the groin. He had suffered from this complaint for about sixteen years, and had been eventually obliged to wear a lace stocking.

On the 9th of January, two needles were introduced across the vein, and it was divided subcutaneously between the needles. A sudden motion occurred during the introduction of the upper needle, and it was observed that some dark coloured blood escaped as the puncture was made. When the needles were removed on the 13th, a similar discharge of dark coloured blood was observed, and it was inferred that the needle, instead of passing under the vein, had perforated it. Some swelling and redness of the skin had appeared around the seat of the operation.

14th. There was a severe rigor, followed by profuse perspiration, which ran down his face. The pulse rose to 140.

A fresh needle was now inserted between the seat of the local mischief and the centre of the circulation. This was done about the middle of the thigh. Care was taken to pass the needle completely under the vein, and the vessel was compressed by a figure of 8 ligature, passed over its extremities.

15th. The pulse had sunk to 100, and the constitutional symptoms had subsided. The needle last inserted was allowed to remain three or four days, when it was removed. No abscess occurred in this case, and the patient was sufficiently well to leave the hospital on the 26th of January, seventeen days after his admission. This patient was seen for another affection on the 2nd of January, 1865. He then stated that he had never had anything the matter with the vein since he recovered in 1862, and had never worn a bandage since that time. The vein at the seat of the operation, where it had been divided, remained obliterated; but that portion of the vessel under which the last needle had been placed was completely pervious, and of the same size as the rest of the vessel.

Case IV.—Thomas Baker, a middle aged man, was bled in the arm on the 28th of March, 1851. On the 22nd of the following month a red, vivid patch of inflammation appeared on the inner part of the upper arm, and on the 25th, some dark coloured matter was discharged from the cicatrix of the wound made in bleeding, which previously appeared to be healed. The inflammation extended, and large vesicles formed principally in the course of the basilic vein. A pad was carefully adjusted, so as to make pressure upon this vein immediately above the inflamed part. During the next two days, the inflammation extended downward in the course of the vessels toward the back of the arm. The skin became livid, and abscesses formed in different parts. The inflammation in this case never extended beyond the lower margin of the pad, which had been placed on the basilic vein.

In any future case, similar to those above related, I would decidedly prefer the operation of subcutaneous section to that of pressure by a compress, or to that of simply passing a needle under the vein for the purpose of obliterating its canal. By the operation of subcutaneous section a permanent union is effected, because it takes place between the opposed portions of cellular tissue on the outside of the vessel. Such union is vascular, and therefore not liable to be broken down. By this operation no suppuration need be excited, and the needles used for the purpose of acupressure may be removed at the expiration of two, three, or four days, when the union will be complete. Union cannot be ensured within the same period by the pressure of a needle placed under the vein. If the needle be removed within the first few days, the current of blood is liable to be re-established through the vein; if it be left, suppuration may be excited on the outside of the vessel; this may lead to the coagulation of the blood, both above and below the part where the vessel is compressed, and the coagula thus formed may undergo the very changes which produced the serious symptoms for which the operation was undertaken. In the third of the above recorded cases this appears in some measure actually to have happened, for although the current of blood through the vein was arrested, yet suppuration took place both above and below the needle last introduced. In the first case, on the contrary, when the vein was divided, no trace of inflammation extended beyond the divided part. In both these cases, the products of the diseased actions were expelled from the interior of the veins by the process of suppuration; but had the flow of blood through the vessels been allowed to continue, some of these same morbid products having been carried in the course of the circulation would have produced their effects in other and distant organs.

As the process of reparation in veins has been variously described by authors, so the different theories propounded have led to different kinds of treatment. At the Veterinary College, even within the last few years, it was publicly taught that a coagulum in a vein was a foreign substance, and ought to be removed; and the jugular vein in horses which had been bled was sometimes slit up for several inches, in order to remove the coagula which formed in successive portions of its course.

To remove coagula in ordinary cases, however, is to remove the very means prepared by nature for the restoration and safety of the parts. Position, topical applications, bandages, and temperature may all have their influence in producing healthy action. As the wounds which precede purulent deposits are generally characterized by feeble powers, those conditions which most tend to invigorate the parts are principally indicated. The irritability of a wound may be appropriately termed a teazed state of it; it frequently appears to be nothing else than a series of attempts to bring about an action, which it has not the power to accomplish; as soon as that is fulfilled which the necessity of the parts demands for their healthy condition, irritation will cease. But no local applications are likely to accomplish this object, unless the powers of the constitution are supported at the same time. It is evident that the treatment of phlebitis ought to be concentrated on the first period of the disease. So soon as portions of a disintegrating or decomposing clot, or the septic products of a wound, have become mixed with the circulating blood, medicine is generally of little avail. It is doubtless true, unfortunately, that in a large number of cases, the contamination of the blood takes place through minute vessels hidden from our sight; and the occurrence of severe constitutional symptoms is the first signal of a malady to which, only too often, there is but one end.

The formation of purulent deposits usually indicates a debilitated state of constitution. It is of much more frequent occurrence in large towns than in the country, and in hospital than in private practice. The depressing influences which give rise to erysipelas and puerperal fever will also predispose to the formation of these abscesses; and as scanty diet, loss of blood, debilitating surgical operations, and overcrowded rooms, have been found among the causes of the former, so may they be looked upon as favouring the production of the latter.

There are several very important points connected with the *etiology* of these diseases, which have not yet been at all satisfactorily worked out.

There appears, for example, to be some intimate etiological connection between such diseases as phlebitis, inflamed lymphatics, the different forms of erysipelas, pyæmia, and putrid infection. They all seem to depend, to a very great extent, upon the presence of specific morbid materials in the blood, either introduced from without, or generated within the animal economy. These diseases frequently prevail at the same time, and their spread—if not their generation—would often seem to depend upon peculiar conditions of the atmosphere, particularly the atmosphere of hospital wards. What is the exact determining cause or causes of these disorders is beyond our knowledge, for we have not yet ascertained what the changes in the secretions of a wound are, which precede the general blood contamination. When this has taken place, however, in whatever form it may develop itself, it would appear to be communicable. It is not an essential character of such communication that the disease so communicated should be exactly the same, for it has happened in my experience (in common with that of others) to have observed the appearance of pyæmial disease in a patient after exposure to the erysipelatous poison. The two disorders are frequently combined in the same patient; a wound exhibiting the local characters of erysipelas, and the constitution exhibiting the symptoms of pyæmia. And the symptoms of puerperal phlebitis, or metria, will occasionally follow in a woman who has been exposed to the poison of erysipelas.

The most important practical lesson to be learnt is, that this group of diseases is preventible to a great extent. Whatever ministers to a defective hygiene, to the presence of decomposing organic matter in the atmosphere—in one word to dirt—supplies the *external* conditions most favourable to to their occurrence; and whatever ministers to the accumulation of those effete and waste products which produce an instable condition of the blood and tissues, supplies the most favourable *internal* conditions. It is too much to hope that we shall be enabled altogether to prevent these accidents to surgery, by the rigorous application of the most sagacious rules; but no one can doubt that much may yet be done. When we contrast the lowest rate of the recorded mortalities in some English hospitals with the highest rate in continental hospitals, we cannot avoid perceiving the existence of causes within our control and therefore remediable.

An abundant supply of fresh air, a nutritious diet, and the most scrupulous attention in preserving a cleanly state of all wounds are the main prophylactic measures.

The treatment of inflammation of the veins, in which purulent deposits frequently originate, is thus spoken of by Sir B. Brodie, after matured observation, "All the experience that I have had on this subject would lead me to believe that, like erysipelas it has its origin in a low asthenic state of the system, and that those persons are especially liable to it who have been much lowered by hæmorrhage at the time of an operation, or by too scanty a diet afterwards. An operation is a shock upon the nervous system, making a great demand upon the vital powers. The effects of this shock are often much aggravated by loss of blood, and a very scanty diet actually makes the patient more liable to some kinds of inflammation. Our mode of practice ought to be rather to sustain his powers by allowing him wholesome nourishment, and not to add to the influence of the other depressing causes, the still worse one of starvation."

The general management of this disease after the formation of purulent deposits has commenced, is probably as little satisfactory as of any that comes under the notice of the surgeon. "What treatment," says Cruveilhier, "shall we oppose to purulent infection? To this question experience is as yet dumb, while the various remedies to which theory would seem to point have failed as signally in my hands as in those of others." The results obtained by Dr. Polli, from numerous experiments on animals, in which he had artificially induced symptoms of purulent infection, justified a trial of the anti-fermentative properties of sulphurous acid; but clinical experience has not verified the expectations entertained. The antiseptic system proposed by Professor Lister, for the purpose of guarding against the occurrence of unhealthy actions in wounds and injuries, is still on its trial, and my observations are of too limited a character to warrant me in pronouncing any judgment as to its merits.

LECTURE V.

VARICOSE VEINS.

ENLARGEMENT of the veins is commonly found in those parts of the body which are most dependent, or in the lowest part of any one system of veins. With regard to the general circulation, varicose veins are most frequently seen in the legs; but they are also by no means unfrequently found in the lower part of the spermatic plexus, and in the most dependent part of the portal circulation. Although essentially the same disease, varicose veins have received distinctive names when they occur in the two situations last mentioned; when the disease affects the spermatic veins it is called varicocele, and when the veins of the rectum are affected a person is said to suffer from hæmorrhoidal tumours or piles. These affections will each require a separate consideration. The plan of treatment in all the cases mentioned may be palliative only, or a radical cure may be attempted. The various plans of giving artificial support to varicose veins of the leg, and of treating the ulcers to which they give rise, have been dwelt upon by so many authors that it is unnecessary to do more than allude to the subject. The radical cure of the disease in the lower extremities, consists in obliterating the enlarged veins, so as to allow the circulation through the part to be carried on by the remaining vessels, which maintain their original size. For this purpose various plans have at different times been devised. But before describing the very simple operation which I have adopted, and successfully practised in a very large number of cases for the cure of varicose veins, it may be well to say a few words upon the anatomical distribution and structure of these vessels.

The subcutaneous veins of the limbs consist of two sets; one being supplementary to the deeper vessels, and the other distributed in and belonging to the integuments. These two systems of veins will be easily recognised upon dissecting an œdematous lower limb. They are distinguished by certain anatomical and physiological peculiarities. The deeper set pursue a straight course towards the centre of the circulation, are larger, less numerous, and possess stronger coats than the superficial ones. They are intimately connected with the aponeurotic investments, by which they are strengthened and bound down to the limb. The tegumental veins—which are easily traced in a body after *post mortem* decompositon has caused the detachment of the epidermis—are very numerous and of small size, forming a finely-meshed and anastomosing network immediately beneath the cutis. These all eventually transmit their blood into the deeper vessels. They possess very thin coats, and receive little or no support from their connection with surrounding tissues. These minute plexuses of tegumentary veins appear to be subsidiary to other purposes besides simple circulation. They probably exercise an influence upon the functions of the skin.

It seems probable also, that in cases of impeded circulation, such as arise from many cardiac or pulmonary diseases, the congestion of the small veins of the skin, and of those mucous membranes which are exposed to the air, may be at once the measure of the degree of impediment to the circulation, and a subsidiary means for oxidation of the blood.

Structurally, veins are very much like arteries, differing from them chiefly in their flaccidity, in the thinness and less pronounced characters of their different coats, and in the presence of valves. The larger veins possess three coats, viz., an internal or epithelial, a middle muscular, and an external fibrous coat. The first consists of a covering of tesselated epithelium, supported by a layer of very fine connective tissue, which forms the so-called basement membrane. The second or middle coat is muscular, consisting of two layers of fibre cells, longitudinally disposed next the internal coat, and circularly arranged externally. The outer coat is tough, and composed of the ordinary white and yellow elastic fibre. The elasticity of veins depends upon the yellow fibre constituent, and varies according to its amount.

The valves of veins, by obstructing all retrograde currents, preserve the system of capillaries from the impulse and congestion that would otherwise ensue. These valves are of extremely delicate structure, being formed by a reduplication of the lining membrane, with a small amount of connective tissue. They are semi-ovoid or lunated in shape, generally placed in pairs, and, during the flaccid state of the vessels, their borders are nearly in contact, becoming separated as the vessel is distended with blood. The tunics of the vein are thinner in the immediate neighbourhood of the valves, and readily yield to the fluid pressure, hence the bulging into pouch-like projections at these parts.

The other system of subcutaneous veins seems to be complementary or compensatory to the circulation through the deep vessels, allowing the passage of blood through their channels when its return through the venæ comites is obstructed by muscular contraction.

In the process by which dilatation of a vein is accomplished, there are two different agents or forces present; the one being constant and physiological, viz., the impulse derived from the vis a tergo; the other physical, in virtue of that hydrostatic pressure, which is a property of the blood in common with all other fluids. If the current of blood be obstructed in some of the vessels of a limb, the vis a tergo must tend to cause dilatation of other vessels. When the venous coats are weaker at one part than another, less supported by surrounding textures, or when there has been long continued exercise of a part of the body in a dependent position, the hydrostatic pressure will cause dilatation of these vessels. The practical fact, then, to be remembered is, that the vis a tergo is a force which must constantly act against obstructions in all positions, while the hydrostatic pressure, following the law that a column of fluid exerts a force proportionate to its perpendicular height, must cease to operate when the body is horizontal.*

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* *Vide* "Varicose Veins and Varicose Ulcers," by J. W. Nunn, Esq., Surgeon to Middlesex Hospital, 1852, to which very practical little Essay the reader may refer with advantage.

Veins are very liable to become varicose, particularly those of the lower limb and left spermatic cord. In a varicose limb the deeper set is generally implicated from an early stage; but it is in the superficial system that the dilatation and varicosity become most apparent. A vein can only accommodate itself to its original position in the tissues, when under the operation of a distending force, by becoming dilated and distorted, hence the curious tortuosities and reduplications which are so commonly witnessed. These will be most apparent where the veins are weakest and least supported by their investments. Varicose veins are commonly the source of much present discomfort, and occasionally of much future danger. Besides the sense of weight, fatigue, and weariness, and the fugitive pains and cramps, which are the usual concomitants of varicose veins, they may cause different degrees of œdema, various diseases and discolorations of the skin, ulcerations, &c. The diseased vessels, moreover, are liable to spontaneous or accidental rupture and consequent hæmorrhage, to attacks of inflammation, and to coagulation of their contents.

The treatment of these affections has been hitherto mainly palliative, for although a radical cure has been very frequently attempted and attended with success, it has been found that operative interference with varicose veins is often followed by a dangerous train of symptoms. The cause of this has only to be duly appreciated, to be in many cases effectually guarded against. What is the reason that a ligature may be applied with perfect impunity to a divided artery on the extremity of a stump, and that surgeons have at all times had some misgiving with regard to performing the same operation on a vein? The reason is, that a diseased action has been not unfrequently known to follow the ligature of a vein, but no similar affection is produced by tying an artery; and the reason of this again, is obvious from the facts previously dwelt upon at length, namely, that should the product of any unhealthy action be formed in an artery, the circulation of the blood has a tendency to carry it *from* the centre of the circulation, but when the same action takes place in a vein the morbid product is likely to be conveyed *towards* the centre of the circulation, and thus to contaminate the blood, or to inflame the channels through which it passes. In the case supposed, an artery would sooner or later discharge its contents on the surface of the stump, but the vein would carry them into the general circulation.

In like manner, after an injury to, or an operation upon a varicose vein, the products of its inflammation, or the admixture of any vitiated matters within the vessel, will tend to pass to other parts.

I have long felt that, in the radical cure of varicose veins, the danger from this cause may be with great certainty prevented, and my experience during the last twelve years has convinced me of the safety and impunity with which many operations upon the veins may be performed.

The means which have been employed for the radical cure of varicose veins have included, 1, injection of some material into them to determine coagulation of the blood; 2, division of the vessels by direct and subcutaneous section; 3, excision of a portion of the trunk of the affected vein ; 4, the application of caustics to the integument over a vein, so as to induce an inflammation which shall spread by contiguity to the coats of the underlying vein, and produce a localized coagulation of the blood and ultimate obliteration of its cavity ; 5, the compression of a vein by twisted suture, with or without its transfixion, and various modifications of this plan.

All these methods are open to objection. Some of them do not attain their end. A radical cure is often not effected, and they all may be dangerous. The clot produced by the application of a temporary ligature may break up, and fragments of it may be conveyed elsewhere, and induce dangerous symptoms ; or if it remain localized, it very commonly breaks up and liquefies in time, and then the varix returns. Those procedures which involve the wounding or injury of the coats of a vein are still worse in their probable results. When a vein is divided wholly or in part, or transfixed by a needle, inflammatory reaction ensues in the coats, and coagulation of the contained blood is produced. The coagulum becomes applied to the divided coats, and adheres to the lymph, which is effused for their repair. The materials engendered during the inflammatory process can readily become mingled with the blood-clot, and it then only depends upon the stability and firmness of the latter, whether these materials shall be localized or pass into the circulation.

The following plan, it appears to me, effectually guards against these accidents, while it effects a radical cure. By subcutaneous section of the vein we prevent the access of air, while we effectually obliterate the vessel by means of the lymph, which binds it to the neighbouring connective tissue. By acupressure of the vein above and below the site of division, we effectually prevent the dangers arising from the formation of a thrombus. In regard to the first we may quote Sir B. Brodie's observation, that the difference between dividing a varicose vein by subcutaneous incision and dividing it together with the skin covering it, "corresponds to that which exists between a simple and compound fracture."

Operation for Varicose Veins.

This is now always done in one sitting. The plan formerly advocated of allowing the blood to coagulate in the vein before it was divided, being clearly superfluous.

The operation is performed in the following manner:—The vein is taken up between the finger and thumb, which are made, as far as may be, to meet behind it. A needle is then passed behind the vein, and made to pass out as near the vein on the opposite side as possible. The vessel is then compressed by an india-rubber band, or a ligature passed over the end of the needle. This part of the operation is repeated in another point of the vein, about an inch distant. A portion of the vessel is thus isolated from the rest of the circulation. It may then be divided or removed without fear of any constitutional effects. Generally a simple subcutaneous division is all that is necessary. There is then no suppuration, no ulceration, and no open wound. The needles used for the purpose of acupressure are removed on the third or fourth day: the upper one generally a day before the lower one. All the parts usually become healed about the seventh or eighth day, and the divided veins are massed together in a knot, and permanently obliterated.

The needles used are generally armed with an elastic band before being placed under the vein, *i.e.*, they are passed through one end of an elastic band, and the other end of the band is passed over the sharp end of the needle, after it has been passed under the vein.

A very slight degree of tension of the bands is sufficient to close the vessels. If firmer pressure be required, as in the case of a number of small veins, the best plan is to apply the india-rubber bands as usual, and to place over them a common figure of "8" ligature. Some swelling will probably occur on the second day, when the ligature may be removed without in any way interfering with the security of the compression. The elasticity of the bands will allow for a certain amount of swelling without being inconveniently tight. If, however, a band becomes very tight, the constant pressure prevents the blood passing through the capillaries, and a streak of white slough may be produced in the skin. This will in no way interfere with the success of the operation, but it may take some days to heal, and thus appear to retard the patient's recovery.

This operation has been performed by myself, and, with some modifications, by various other surgeons a great number of times. So far as I know, no serious symptoms have ever supervened, where due care has been taken that the sides of the vein should be brought together without being injured by the needles.

It is sometimes difficult to be sure that the needles introduced pass fairly under the vein, but this object may, in the great majority of cases, be certainly obtained by a little manœuvre. The vein is first pressed out of its bed with the finger, and the needle is then introduced, so that its point may pass into the bed of the displaced vein. The needle being then left at rest, the vein is allowed to regain its natural position, and in doing so it rolls over the point of the needle. The vein is then pressed with the finger in the opposite direction towards the head of the needle, the point of which may then be brought out without danger of injuring the vessel.

When a needle is passed in this way fairly behind a vein, and left there for two or three days only, it is almost impossible that it should excite any mischief in the interior of the vessel, while the pressure it exerts effectually prevents both hæmorrhage and absorption.

In operating upon large veins, it is a point of primary importance that the needles should always pass fairly behind them; for if they transfix the vessels, an interval may be left between the needle and the side of the vein farthest removed from the surface. Independently of the chance of exciting inflammation by puncturing the coats of the vessel, the channel may then not be completely closed, and a passage to the general circulation may be left for any morbid product that may be present.

The case is, however, different with regard to small veins; when a needle pierces into one of these, its small cavity must necessarily be very nearly, if not quite, obliterated. The same care, therefore, is not necessary in operating upon veins of a small size. Clusters of varicose veins in the legs may, for instance, be pierced by a needle and tied with impunity. If a figure of "8" ligature is placed round the ends of the needle, the small veins which may happen to be punctured are subsequently as completely closed as if the needle had been made to pass under them.

The existence of varicose veins is considered as a physical disqualification for our public services, and it is also a very frequent cause of invaliding. Many of my cases have been derived from these classes.

In several instances, sailors have been sent to me by Dr. Clarke from the Royal Naval Rendezvous, Tower-hill, who had been rejected as unfit for duty, and who after after having this operation performed, were received within a fewdays orweeks into the navy.

It would be tedious to relate at length even a small part of the cases in which this operation has now been performed, since they all follow very much the same course, and are attended with the same success.

The following, from the pen of a former demonstrator of anatomy upon whom the operation was performed, was published by him in the "Lancet" for July 22, 1865, and may be taken as a fair specimen of the operation and its results.

This gentlemen, after having completed his medical studies, wished to join the army, but was rejected at the Horse Guards for varicose enlargement of the external saphenous and tributary veins of the left leg. He says :—

"July 6th, 1864.—Mr. Lee inserted two pins under the vein at the upper part of the calf, the pins being about three-quarters of an inch apart; and the vein was pressed against these pins by means of india-rubber ligatures. About four inches lower down, the vein was again secured by two pins, at the same distance from one another as before, and similarly ligatured. The vein was next divided between each pair of pins by a sub-cutaneous incision, the only blood lost being that contained between the pins of each pair. Small pads were placed over the incisions, and the leg carefully bandaged. I declined having chloroform administered, as I wished to watch the operation, and the pain was of short duration. Ordered to remain in bed. No restriction as to diet.

"7th.—Had about four hours' sleep during the night after the operation. Experienced slight pain and twitchings in the course of the divided vein and accompanying nerves.

"8th.—The lower pin of each pair was removed. Very slight twitchings, and no pain worth mentioning to-day.

"10th.—The upper pin of each pair was removed.

"13th.—Walked a little about the room with the aid of a stick.

"14th.—Called on Mr. Lee at his house in a cab, being rather lame, but able to walk ten or twelve yards 'at a stretch,' without a stick or other support.

"The vein was still slightly painful on touch, but evidently obliterated. The bandaging was continued for a few days. The lameness disappeared about a week after the operation, and soon after I passed the physical examination at the Horse Guards.

"June 27th, 1865.—The vein is now perfectly obliterated, and the enlarged tributaries reduced to their normal size.

"As the veins have just been subjected to two or three months hard cavalry drill, mounted and dismounted, I think the case is a good example of successful obliteration."

I have now operated in the way described, in a large number of cases at St. George's and at King's College Hospitals, and in private practice. From the 29th of August, 1861, to the 11th of March, 1863, I find in one case-book detailed notes of nineteen cases of varicose veins and eight cases of varicocele, operated upon in St. George's Hospital alone. The following is an abstract of these nineteen cases, in the order in which they occurred. All the cases operated upon within the period are included, except those which require particular mention, and which are noticed elsewhere.

M. C., æt. 23, had suffered from varicose veins for twelve months.

Sept. 6th. The internal saphenous vein of the left leg was operated upon in the usual manner. The needles were withdrawn on the 10th, and the patient was discharged cured on the 18th.

W. D. had varicose veins, accompanied by an ulcer of the leg; the internal saphenous vein was divided subcutaneously on the 15th of August, and he was made out-patient on the 28th of the same month.

J. P., a soldier who had returned from General Havelock's army on account of varicose veins, was operated upon on the 23rd of August. The saphenous vein was divided about four inches above the left knee, and a cluster of veins on the same side was operated upon at the same time below the knee.

This patient was discharged, cured, on the 25th of September.

T. L., æt. 35, not of very temperate habits. Operated on October 24th, 1861.

October 29th, the needles removed.

November 13th, discharged cured.

A. T., æt. 26. The internal saphenous vein was operated upon four inches above the knee on the 14th of October, 1863.

October 19th, the needles were withdrawn.

October 25th, cured.

William H., æt. 29. Subject to varicose veins for five or six years. The posterior saphenous vein operated upon on the 3rd of October, 1861. Discharged cured October 19th.

James R., æt. 56. Duration of disease five years. The internal saphenous vein operated upon six inches above the knee, and four inches below it, on the 28th of August, 1861.

This patient was suffering from piles, and was kept in the hospital until the 16th of October.

N. R., æt. 62, admitted into St. George's Hospital for a varicose ulcer of the leg, of 19 years' standing.

The internal saphenous vein was operated upon four inches above the knee, on the 31st of October, 1861. The needles were removed on the 4th and on the 6th of November. The ulcer near the ankle had now diminished to one-half its original size. Discharged cured November 23rd.

J. G., æt. 45, admitted with an ulcer, depending evidently upon a varicose condition of the veins of 12 years' standing. The internal saphenous vein below the knee was operated upon on the 5th of September, 1861.

September 9th, the needles were removed.

October 2nd, discharged cured.

Mary R., æt. 30, had suffered from varicose veins for 13 years. The internal saphenous vein was operated upon below the knee on the 5th of December, 1861.

December 9th, the needles were removed.

December 28, discharged cured.

Ann P., æt. 46, subject to varicose veins for 10 years.

November 14th, operation below the knee.

November 19th, the needles withdrawn.

December 23rd, discharged cured.

William Y., æt. 42, varicose ulcers. The internal saphenous vein was operated upon below the knee on the 2nd of January, 1862. India-rubber bands, instead of the " 8 " ligature, were used in this case for the first time.

January 7th, needles removed.

January 9th, the ulcers had healed.

January 11th, discharged cured.

Ann F., æt. 32, varicose ulcer on leg, with eruption on skin, commencing in small boils.

The internal saphenous vein operated upon May 8th, 1862. Some ulceration followed along the track of the upper needle. Left the hospital June 5th. The vein quite obliterated, but still slight irritation along the track of the upper needle.

Adelaide F., æt. 52, varicose ulcer, accompanied by varicose veins of ten years' duration. Operation on the vein three inches below the knee on February 6th, 1962.

February 10th, the needles removed.

Discharged cured February 26th.

A. W., æt. 60, varicose veins for 10 years. Ulceration near the inner ankle.

Internal saphenous vein operated upon below the knee March 6th, 1862.

March 11th, needles removed.

March 22nd, made out-patient.

W. B., æt. 22, operation for varicose veins of the leg, December 18th.

December 22nd, the needles removed.

December 26th, was sufficiently well to get up.

January 1st, 1863, had an attack of erysipelas of the face, which kept him in the hospital until the 14th, when he was discharged cured.

M. P., æt. 27, operation January 29th, 1863. Discharged cured February 11th.

E. D., æt. 34, varicose veins, accompanied by dark patches in skin of the leg.

Operation May 3rd, 1865.

Discharged cured June 3rd.

E. W., æt. 30, varicose ulcer of the left leg of six years' duration,

Operation April 9th, 1863.

April 13th, the needles removed.

April 21st, discharged cured.

The operation for varicose veins, when performed in the manner above described, has been attended with such uniform success, and the cases have run such a similar course, that it appears unnecessary to relate any further instances. But the question at once arises as to whether the cures effected in this way are permanent. Now in hospital practice the great majority of patients are lost sight of, unless they again become ill, and it is extremely difficult to give anything approaching to an accurate statistical statement of the results of operations after the lapse of years; a considerable number of cases that have been operated upon for varicose veins have, however, at a later period fallen again under my observation. In several instances I have found the vein, after several years, to have remained perfectly obliterated, and the inconvenience from which the patient had suffered to have been entirely removed. In other cases I have found the current of blood to have been re-established through a collateral channel. The vein operated upon has remained impervious, but a collateral branch has become enlarged, and opened into the originally dilated vein above the obliterated point; when this has occurred there has generally appeared to be a constriction at the point where the newly dilated vein has opened itself, and this has appeared to act as a kind of valve at the part. In several cases where this has happened the patients have been enabled to continue their usual occupations without any inconvenience, and without the aid of artificial support. This enlargement of the collateral veins does not, however, always take place. Among the cases in which the obliteration remained perfect without any increase of the neighbouring vessels, I may mention particularly two ; one of these was a medical man, a friend of my own, who, whenever he came to London, called to show me his leg. The other was a gentleman residing at Kensington, who, before the operation, could never move out without a lace stocking, and who, afterwards, habitually walked into town and back without any inconvenience, and without any mechanical support. Both these cases were operated upon several years ago.

In a few instances, after the lapse of time, the veins have become apparently very much in the same condition as they were before the operation, but even in these cases the patients have been relieved from the inconvenience existing at the time, and have enjoyed a period, more or less prolonged, of comparative comfort. In one case I performed the operation a second time in the same situation.

LECTURE VI.

VARICOCELE.

THE term varicocele might with propriety be applied to a swelling caused by dilated veins in any part of the body; but common usage has restricted the name to an enlargement and dilatation of the veins of the spermatic cord.

The causes of varicocele are the same as those which produce enlargement of the veins in other parts. The particular local conditions which have been supposed to favour the occurrence of varicocele are very numerous. Thus the presence of an inguinal hernia, cysts and tumours in the cord, swellings of the lumbar glands, and hydrocele, have all been noted as tending to produce this disease. The accumulation of fæcal matter in the sigmoid flexure of the colon has also been supposed by many eminent physiologists to be a not unfrequent cause of varicocele, and this has been adduced as a reason why the affection is found more often on the left than on the right side of the body.

Warmth has undoubtedly the effect of relaxing the venous circulation generally; and it certainly relaxes the scrotum in a very peculiar manner. But the cause which tends most directly to produce this disease is the prolonged congestion of the spermatic veins. M. J. L. Petit compares the passage of the spermatic veins over the pubis to the passage of a tube over a pulley, and conceives that the blood returning against its specific gravity, with this great mechanical disadvantage, is one great reason of the frequent occurrence of varicocele. After all these circumstances have been enumerated, there remains to be considered some inherent predisposition in the vessels themselves. Thus it is not uncommon to find many members of the same family showing the same tendency to this affection, although their habits of life may be entirely different.

Symptoms of Varicocele.—The pain experienced is of the most variable kind: with a very slight enlargement of the veins the pain is sometimes considerable; while, on the other hand, with veins enlarged to many times their natural size, no pain is in some instances experienced. Generally, however, a dull aching sensation is felt at intervals, and especially after prolonged exertion. This is often confined to the part itself, but is sometimes experienced in the loins, in the inguinal region, and in front of the thighs. This pain is frequently accompanied by a sense of languor, by mental depression, and by hypochondriasis. But by far the most important symptom connected with this disease is wasting of the testicle.

As varicose veins in the legs, after they have existed some time, produce imperfect nutrition of the parts whence they are derived, so a dilated condition of the spermatic veins appears to have a tendency to induce imperfect nutrition of the testicle. This is followed by a wasting of the organ, and loss of natural power. The testis becomes at first soft, then diminished in size, and in some cases almost disappears.

Treatment of Varicocele.—The palliative treatment of varicocele, consists in removing any general or local causes which may have tended to produce congestion of the spermatic veins—the application of astringent lotions, cold ablution, and the mechanical support of the parts by different forms of suspensory bandages.

The radical cure can only be effected by the obliteration of some of the enlarged veins. It was not long after the first trial of acupressure, combined with sub-cutaneous section, for the cure of varicose veins in the lower extremities, twelve years ago, that an opportunity presented itself for treating the varicose veins of the spermatic cord in the same manner. My experience of this operation has now become extensive. I have long been in the habit of performing it both in hospital and in private practice, and can recommend it with very great confidence.

The operation for the radical cure of Varicocele is briefly as follows:—The patient usually takes a little chloroform, sufficient to render him for a minute or two regardless of pain, but not sufficient to render him fully insensible. The scrotum, on the side of the varicocele, is then taken between the fingers and thumb, and the vessels are allowed to glide one by one out of the hand. Presently the vas deferens will escape, and may always be known by its peculiar hardness. As soon as this is separated from the other vessels, two needles are passed beneath the veins about an inch apart. These are made to pass between the vas deferens and the veins to be operated upon. Pressure is then made by means of elastic bands, passed over the extremities of the needles, and the veins are divided subcutaneously in the interval between them. A very thin knife is introduced horizontally, with its edge directed upward or downward. This passes, like the needles, between the vas deferens and the affected vessels. This part of the operation may be performed while the affected veins are retained between the finger and thumb. The edge of the knife is then turned forward, and the cluster of veins divided towards the skin. In doing this, it is convenient to place the fleshy part of the thumb of the right hand over the veins, in order to prevent their yielding before the knife. When the knife is introduced, care should be taken that it is not passed below more veins than are included in the ligatures.

A little blood sometimes flows out of the wound made by the knife, but this in general amounts to an insignificant quantity. Some slight hemorrhage into the cellular tissue will also occasionally follow, and may give a little pain by distending the parts around the ligature, but this in no way interferes with the ultimate success.

The elastic bands and needles may be removed on the third or fourth day after the operation. The divided vessels will at that time be closed by lymph effused from the surrounding cellular tissue. In three or four more days this lymph will have become firm, and the veins permanently obliterated.

It will sometimes happen that the hemorrhage is not completely arrested by the acupressure. This depends upon a vessel having been divided which has not been compressed. The bleeding is generally venous, and may then be stopped by pressure, but should it continue, a fresh needle may be introduced *below* the incision, sufficiently deep to include the divided vessel, without interfering with the vas deferens. In three instances it has occurred to me to witness some arterial hemorrhage, and this in each case was immediately and effectually commanded by inserting a fresh needle beneath the bleeding vessel, and applying acupressure *above* the incision. After the india-rubber bands are stretched over the ends of the needles, a "8" ligature may be also applied over the bands. Some swelling will probably occur on the day after the operation, when this ligature may be removed, and the elasticity of the india-rubber will then allow for a certain amount of swelling, and will exercise quite sufficient pressure to keep the vessels closed.

The results of this mode of operating have proved most satisfactory. In almost all the cases, the veins operated upon have remained permanently obliterated. In some few they have become again enlarged after a time. In none have any symptoms of constitutional disturbance, such as would be produced by the absorption of diseased secretions, presented themselves.

It has been most gratifying to observe in some cases of commencing atrophy of the testis, that after the operation the proper nutrition of the part has been restored, and the organ has regained its natural size and firmness.

The following are instances, among many, in which the veins were divided immediately after the introduction of the needles :—

J. A., æt. 22, single, was admitted into King's College Hospital, December 3rd, 1858. He stated that about the age of 14 he began to experience inconvenience on the left side of the scrotum, and a sense of great weakness in the left testicle. More recently he has experienced pain in the same situations, and for two months past has in consequence been a patient at St. Thomas's Hospital. Upon examination the spermatic veins on the left side were much enlarged, and tender to the touch. The swelling completely disappeared when he was in the recumbent position.

On the 15th, two needles were introduced three-quarters of an inch apart beneath the enlarged veins, care being taken not to include the vas deferens. A very thin sharp knife was then introduced underneath the veins and between the needles, and the whole cluster of veins was divided towards the surface : very little hæmorrhage followed.

December 18th.—Considerable swelling of the scrotum had taken place. The needles were removed on the fourth day.

20th.—Feels much better; pulse perfectly quiet; swelling in a great degree subsided.

24th.—Feels quite well; pulse 60; some thickening around the divided spermatic vessels.

31st.—Some thickening remains in the line of the incision. The swelling above and below this has entirely subsided. Feels quite well, and entirely free from pain. To leave the Hospital to-morrow morning.

1859, January 13th.—Came to report himself, feeling free from any inconvenience.

17th.—Again presented himself with a letter of thanks for his cure. The veins appeared quite consolidated in the line of incision.

An officer left his regiment in India and came to this country under a medical certificate, for the purpose of being cured of a varicocele. The operation was done as in the preceding case. The needles were removed upon the fourth day. There was no constitutional disturbance whatever. The scrotum was discoloured, in consequence of some blood which had become extravasated. This gentleman got up on the sixth day, and left town on the twelfth day after the operation. I have reason to believe that his recovery was quite satisfactory.

A gentleman had suffered for years with pain and a sense of weight after exercise, in consequence of a cluster of varicose veins connected with the left spermatic cord. He came to town for the purpose of being relieved, and the operation was performed in the usual manner. During the following night he experienced pain and was restless. Upon examination, it appeared that some effusion of blood had taken place between the ligatures, and had distended the skin, so that these had become very tight. The pain subsided during the day. There was no constitutional disturbance. On the fourth day the needles were removed, and on the seventh day the patient was down stairs. His recovery has been permanent.

C. B., æt. 20, was admitted into St. George's Hospital on the 10th of April, 1862, having suffered from varicocele for six months. The operation as above described was performed on the 17th, with the india-rubber bands.

April 21.—Experienced very little pain; some hiccough. Did not sleep well; appetite good.

18th.—The needles were removed.

24th.—No pain; pulse 68; slept well.

26th.—Quite free from pain, except when he walked.

May 3.—There was still a slight discharge of pus from the track of the needles.

14th.—Discharged cured.

F. A. G. was admitted into St. George's Hospital on the 18th of November, 1862, having suffered from hernia and varicocele of the left side for the last two years.

November 20th.—The operation for varicocele was performed without interfering with the hernia.

21st.—Passed an indifferent night; pulse 80.

24th.—The needles were removed.

26th.—Was free from pain; appetite good.

December 5th.—Convalescent.

S. F., æt. 20, admitted into St. George's Hospital on the 17th of December, 1862, having suffered from varicocele for twelve months.

December 18th.—Operation performed.

22nd.—The needles were removed.

24th.—Got up of his own accord.

26th.—Discharged cured.

R. C., æt. 23, was operated upon in St. George's Hospital on the 5th of February, 1863. He had suffered from varicocele for two years and a half. The left testis was now almost wasted away.

February 9th.—The needles were removed.

14th.—Discharged cured.

December 31st.—The patient again presented himself at the Hospital. The left testis had much increased in size, and was now as large as the right. There had been no recurrence of enlargement of the veins, nor any inconvenience on that side since he left the Hospital. On the 31st of December, 1865, the patient, writing upon another subject, incidentally remarks, "you literally *made* me a *testicle.*"

In performing the operation for varicocele, it is important that the bands should not be drawn too tight over the ends of the needles. The parts involved in the operation sometimes swell very rapidly, and the skin immediately under the ligatures or the bands may very soon slough. The success of the operation is not interfered with by this, but the recovery of the patient is protracted. It will sometimes happen that the portion of skin between the needles will slough together with the subjacent cellular tissue, and sometimes an abscess will form on the loose cellular tissue of the scrotum. These local accidents have never, as far as my observation has gone, been attended with any great degree of constitutional disturbance, and the cicatrix left has appeared to afford an additional security against a recurrence of the varicocele. In a few instances where the part has become very much relaxed, I have, at the time of the operation, removed all the skin, the cellular tissue, and veins which were included between the needles. This proceeding has been attended with very little hæmorrhage at the time, and the cicatrix produced has afforded a firm support to the part afterwards.

The late Mr. Briggs occasionally removed a considerable portion of the skin of the scrotum in cases of pendulous testis, and the cicatrix left maintained the testicle in something like its natural position. This operation succeeded well enough when the case was not attended with enlargement of the veins; but when it was, the removal of the skin could have little or no effect upon the varicocele. At the time to which I refer, no one thought of cutting deeper than the skin, as no means were then in use which would effectually control hæmorrhage from the spermatic veins in case they were wounded. Mr. Briggs' operation, then, was well adapted for a case of pendulous testicle where the veins were not enlarged, but not for a case accompanied by varicocele. A case presented itself some years ago in which the testis hung so low, that when the patient lay upon his back it would hang over on the outer side of the left thigh. There was, in this instance, a well marked varicocele. Knowing that I had the means by acupressure of controlling the dilated veins, it appeared practicable to combine Mr. Briggs' operation with that for obliteration of the veins. Accordingly, the needles were introduced as far apart as possible, and, after the veins were secured by the "8" ligature passed over the ends of the needles, the intermediate portion of skin, together with subjacent tissues, containing the enlarged veins, was removed, leaving a very considerable gap. No hæmorrhage occurred. The needles were then drawn towards each other, and by this means the edges of the wound were brought together and maintained in position.

This was the first case in which this operation was performed. The wound readily healed, and the testis was subsequently retained very nearly in its natural position.

Lecture VII.

THE OBLITERATION OF VARICOSE VEINS.

There is at present in the Hospital a man named R. C., æt. 23, who was admitted eleven months ago, with varicocele of the left side. The left testis had then nearly wasted away, and the dilated veins were painful. He had for two years and a half been under the care of different medical men, and had taken large quantities of medicine without relief.

On the 5th February, two needles were passed between the enlarged veins and the *vas deferens,* and slight pressure was applied to the veins by means of ligatures passed over the ends of the needles. The veins thus compressed by the ligatures were then divided midway between the two needles, by subcutaneous section.

On the day following the operation, the testis of the affected side was very tender; the next day it was swollen; the ligatures over the needles were removed.

Feb. 9th.—The needles were removed; the patient was quite easy and free from pain.

Feb. 10th.—A considerable amount of thickening had taken place in the scrotum on the left side.

Feb. 14th.—The left testis appeared about twice the size that it was when he was admitted.

He now left the Hospital and went into the country. Upon his re-admission, 11 months after the operation, the veins which had been then obliterated had not again enlarged, but the left testicle had nearly regained its original and natural size. He had experienced no pain in the part since leaving the hospital, and had remained without inconvenience. Of late, however, he had been suffering from some pain in the right testis; the veins on that side were somewhat enlarged, and the testis he believed had become smaller than formerly. Recognizing the symptoms, as he believed, with which the atrophy of the left testis commenced, he came to town of his own accord in order to ascertain whether the disease could be averted by the same means as had formerly been adopted on the left side.

I take the foregoing as the text of a lecture because it is one of a large number of cases of enlarged and varicose veins which have been operated upon in this hospital, and an opportunity is now afforded to all those who are interested in the subject, of observing the results of the operation nearly a year after it was performed.

My principal object, however, in recurring to the subject of varicose veins and their obliteration, is to review concisely the causes which have prevented an apparently very simple operation from having been as safely practised in former times as at present; and what I have now to say will apply equally to varicose veins of the leg or of the scrotum.

Sir Everard Home was at one time in the habit of applying a ligature to the *vena saphena major* in cases where the veins of the leg were varicose. In these operations the skin was divided, and a silver needle with ligature was passed under the vein, and the vessel was tied. It was erroneously supposed at that time, as I have already stated, that the lining membrane of a vein when irritated would secrete lymph, just as a serous membrane might, and that the opposite sides of the vessel would thus be glued together.

Mr. Travers, in his very valuable observations on wounds and ligatures of veins, has expressed the idea generally prevalent in his day in the following words :—" The inner membranes of arteries and veins are susceptible of the adhesive inflammation. In veins the inflammation extends from the point irritated towards the heart. The lymph coats the vein like a fringe." The following account, taken from Mr. Travers' work, affords a description of the effects occasionally observed in his day after the operation of placing a ligature upon a vein :—

"I remember about the year 1801, when the operation of tying the saphena major vein was frequently practised for varicose ulcers of the legs, an elderly woman being the subject of this operation, which was performed in Guy's Hospital, a little above, and on the inner side of the knee. Inflammation of the vein followed, and several abscesses formed in the direction of the vessel, below the ligature, on the inner side of the calf of the leg. It was accompanied with great constitutional disorder; some of the abscesses ulcerated, others advanced with great difficulty to the surface, and the patient died, worn out by excessive irritation. In a second case, that of a man who had drunk hard, two ligatures were made upon the vein, and the vessel was divided between them. In three days the man complained of pain in the course of the vein from the place of its division to the groin ; an inflammatory blush appeared upon the leg, extending from the knee to the ankle, and on the succeeding day considerable swelling. The pain above the ligature extended to the bottom of the belly, and the thigh became swollen and tender upon pressure ; the constitution sympathized with the local disease, and without the formation of abscesses as in the former case. This man died, as it appeared, from extended inflammation of the vein."

Mr. Hodgson mentions two cases in which the division of the varicose vein terminated fatally ; the first on the morning of the fourth day, the second on the seventh or eighth. The same author relates a case from the practice of Mr. Freer, of Birmingham, in which the ligature of a varicose vein was followed by pain in the chest, hurried and laborious breathing, and vomiting of blood four hours after the operation, which symptoms were immediately relieved by the removal of the ligature. The operation was followed by fever and vomiting, and retention of urine, when performed on another varicose vein of the same patient six weeks afterwards, although the ligature was removed immediately after its application ; and again by similar symptoms of constitutional disorder, when repeated upon two other veins after an interval of nine weeks, the ligatures being cut away immediately after their application. The fever went further on the latter occasion; the patient was attacked with delirium and severe vomiting on the second day; the symptoms continued on the third and fourth days; on the sixth she was slightly delirous, and her respiration much oppressed. "In this case," says Mr. Hodgson, "the obliteration of the vein was the consequence of the application of a ligature which was immediately removed."

In the fifth volume of the "Edinburgh Medical and Surgical Journal," Mr. Oldknow, surgeon, of Nottingham, communicates the following important narrative:—

A young man, about 23 years of age, of plethoric habit, had been troubled for the last two or three years with painful ulcers about the inner ankle of the right leg, which repeatedly healed, and broke out again, so as to prevent, in a great measure, his attendance to business; he, therefore, became desirous, on my representation, of having the saphena vein tied, it being varicose to within a hand's-breadth of the knee. The operation was performed in the following manner. An incision, three-quarters of an inch long, and about one inch and a half above the distension, was made through the skin, immediately over the vein, and in the direction of its course. The cellular substance was then carefully divided, the vein lying deeper than usual, until its upper surface was completely exposed. A probe armed with a double ligature was passed under the vein, taking care to include nothing with it, it being clearly dissected from the surrounding cellular membrane upwards and downwards as far as the extent of the first incision, and then tied. The portion of the vein between the two ligatures being afterwards cut out, the lips of the wound were brought together by a suture and adhesive plaster, with a view of healing it by the first intention. The patient was then put to bed, and directed to use a cold embrocation. On the second day he took some opening mixture. Third day, the wound was dressed, and appeared wholly united, except when the ligatures came out. The suture was cut out, and a fresh adhesive plaster applied. On this day he complained of pain in the lower part of the limb, that is, from the lowermost ligature, along the vein down the foot, to use his own expression, as if the blood in the veins were endeavouring to overcome the obstruction caused by the ligature. This sensation was, however, entirely removed by applying a bandage moderately tight, from the toes upwards. On the fifth day there appeared a little erythematous blush about the wound. He had a trifling epistaxis, and I thought proper to take from him sixteen ounces of blood, which was not inflamed; the purging mixture was repeated. Sixth day, complained of a little pain on the inner side of the knee, in the course of the vein; but there was no external inflammation at that part. The lips of the wound began to separate. In the evening he was suddenly seized with a violent rigor, succeeded by a hot fit, and symptoms of great vascular action, and some tendency to delirium. Pulse 130; hard and full, therefore sixteen ounces of blood were taken from the arm; it gave instantaneous relief, and was followed by the sweating stage, which continued several hours, and was succeeded by a state of quietude, soon however, interrupted by a recurrence of the same train of violent symptoms, at first about once in twenty-four hours, but gradually increasing in frequency, and diminishing in strength, till nature became exhausted; death closing the scene twenty-two days from the operation.

For the first four or five days after the rigor, the wound discharged pretty freely, and by making strong pressure about the knee, a little matter was forced from it. The inflammation crept gradually up the vein, which was evident from its peculiar cord-like feel, and from giving pain on pressure, until it reached the groin, the inferior part getting well as the superior became bad, so that the wound was nearly healed before death, the ligatures having separated about the fourth day. There was no tumefaction of the cellular membrane, no enlargement of the glands in the groin, no superficial inflammation on the thigh. There was, it is true, a slight redness of the skin when the poultice was removed (for the thigh, along the course of the vein, was covered with cold poultice), which entirely vanished on exposure to the air. The medical treatment was strictly antiphlogistic; the patient was repeatedly bled, and with apparent relief every time. Two days, however, previous to his death the vital principle was so exhausted as to need the use of cordials.

Mr. Abernethy believed that it was the ligature that produced the inflammation of the veins in the cases in which such serious mischief followed, and he recommended that the vein should be divided instead of being tied.

Sir Benjamin Brodie adopted Mr. Abernethy's suggestion, and instead of tying the *vena saphena,* cut it across, and applied a compress and bandage. The patient had venous inflammation, attended with very severe typhoid symptoms, and died within four days after the operation. Now, in all the cases to which I have alluded the interior of the divided veins was closed by fibrin only, deposited from the blood. Such a bond of union is constantly liable to give way, and the contents of the veins are then carried into the general circulation. Coagula in veins are in this way, as I have already explained, very readily removed, and if formed from healthy blood, they often appear to produce very little inconvenience to the system. But if these coagula have already begun to undergo morbid changes, or if they have already become mixed with other secretions in their neighbourhood, then the most severe symptoms of blood poisoning may be produced. When a vein is simply divided, a certain amount of hæmorrhage necessarily follows, and the blood thus effused may undergo morbid alterations, as it lies at the open mouth of the vessel, and these same diseased actions may be readily communicated to the blood still within the vein, and be thus propagated to every part of the body.

The operation of tying a vein affords no security against such accidents; for, in accordance with an observation made by Sir Benjamin Brodie, as the ductus choledochus, or the intestinal canal, will heal after the application of a ligature, without *the continuity of the canal being destroyed,* so it appears to be with divided veins under certain circumstances. Whenever the circulation through a vein is thus restored, the coagula of fibrin which temporarily obstructed its canal are, sooner or later, carried into the general circulation.

It appears to us strange, in the present day, that so many centuries had elapsed before a simple mode of securing a bleeding artery was discovered ; and it appears almost equally strange that, although surgeons of the highest intellect in the present generation have, in successive years, given their attention to the best mode of operating upon varicose veins, no method should have been adopted by them for effectually closing the vessels during and after the operation. As in former times the actual cautery was used for the purpose of arresting hæmorrhage, so are there still in modern surgery those who prefer the actual cautery, or some kind of caustic, to the simple mode of closing a vein which I have described in a previous lecture. There has very recently been in this hospital a young woman who had had, I believe, upwards of a dozen sloughs made on her by the actual cautery, and in a recent number of the "Lancet" the same mode of treatment is advocated by a distinguished surgeon attached to one of our metropolitan hospitals.

Sir Benjamin Brodie some years ago applied the caustic potash over clusters of smaller veins, in order to produce their obliteration, and Mr. Mayo subsequently adopted the same treatment for varicose veins of a larger size. Sir Benjamin Brodie has left us the result of his experience in the following words :—" The application was very painful; the slough took a long time to separate; the sore took a long time to heal, and altogether it was a very tedious process."

LECTURE VIII.

ON THE REPAIR OF ARTERIES AND VEINS AFTER INJURY.*

FROM numerous experiments made by Dr. Jones† he came to the conclusion that when an artery was divided, three coagula were formed in the process of repair—one of blood externally, one of lymph just within the extremity of the canal, and one of blood within its cavity. "I have called that of lymph a coagulum," he observes, "because it may be considered a distinct substance—effused in such a quantity as to form a mass of a determinate figure." When a ligature is applied to an artery in the usual way, the wounded internal surface of the canal, Dr. Jones says,‡ being kept in close contact by the ligature, adheres. "It seems to be entirely owing to the effusion of lymph that this union is effected."

Hunter in the same way believed that the lining membrane of the blood-vessels is subject to inflammation like other parts, and that inflammation may terminate there as elsewhere in adhesion and suppuration. He says, "In cases where I have had the opportunity of inspecting veins after death, I have found the inflammation in the adhesive state; in some places the sides of the vein were adhering, and in others the inner surface of the veins was furred over with coagulable lymph."* From the account given of the first case in which Hunter tied the femoral artery for popliteal aneurism, in the "London Medical Journal" for 1786, it is evident that his object was to procure adhesion of the opposed sides of the vessel. For this purpose he employed four ligatures, as appears from Sir E. Home's account of the operation (p. 225). Having, he says, disengaged the artery from its lateral connections with the knife, a double ligature was passed behind it by means of an eyed probe, and the artery tied by both portions of the ligature, but so lightly as only to compress its sides together. A similar application of ligature was made a little lower down. The reason for passing four ligatures was to compress such a length of artery as might make up for the want of tightness. On the ninth day after the operation there was considerable discharge of blood from the part where the ligatures passed out, and a tourniquet was applied. On the 8th of March, the operation having taken place in the previous December, the wound broke out again. The patient was ultimately dismissed as cured on the 8th of July following. It is evident from this description that Hunter expected adhesion of the opposed sides of the artery to take place, and as evident that such adhesion did not occur. What Hunter meant by adhesion he himself tells us: "In adhesive inflammation, the vessels being enlarged, begin to separate some portion of coagulating lymph with some serum, and also red globules, and throw it out on the internal surface, probably through the exhaling vessels, or perhaps open new ones, and cover the sides of those cells which easily unite with the opposite, with which they are in contact, forming the first progress of adhesions."*

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* The substance of this lecture appeared in vol. L of the "Medico-Chirurgical Trans.," published by the Royal Medical and Chirurgical Society of London, as a joint contribution by Dr. Lionel S. Beale, F.R.S., and myself.

† Jones on "Hæmorrhage," p. 63.

‡ Ibid., p. 160.

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* "Transactions of the Society for the Improvement of Medical and Chirurgical Knowledge," vol. i, p. 23.

As lately as 1864 Sir James Simpson has expressed the opinion in his work on Acupressure that mere apposition is sufficient to close the largest arteries laid open in surgical operations.† And Mr. Lawson Tate, who appears to have adopted Sir James Simpson's principles and practice, states that if the coats of an artery are kept together for a few days they will unite.‡ Now, all these authors seem to agree in the idea that the lining membrane of blood-vessels will secrete lymph in the same way as a serous membrane will do when it is inflamed. That such is not the case with regard to the lining membranes of veins I endeavoured to show in an essay published in vol. xxxv of the "Transactions of the Medical and Chirurgical Society" for the year 1852.

It is now my principal object to demonstrate the nature of the process which results in the repair of an artery or a vein after it has been wounded. That it does not consist essentially in the effusion of lymph from the lining membrane of the vessel may be proved. Indeed Virchow has given the particulars of thirteen experiments in which he irritated the lining membrane of arteries by various means, and in no instance was there any plastic exudation from the surface of the lining membrane.

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* Works by Palmer, vol. iii, p. 349.

† On "Acupressure," p. 535.

‡ Braithwaite, "Retrospect of Medicine," vol. liv, p. 315.

Experiment I.—A horse having been placed at my disposal by Mr. Dollar, veterinary surgeon, of Bond Street, the carotid artery was opened and the hæmorrhage suppressed as well as could be managed by compression and bandage. The animal was killed at the expiration of seventy-two hours. The wound in the artery, as shown by the accompanying preparation, is contracted and puckered, but there is not the least sign of any effusion of lymph on its lining membrane.

Experiment II.—A donkey having been provided by Mr. Field, veterinary surgeon, an acupressure needle was left in contact with the main artery above the knee for three whole days. The animal was then killed. The artery, as shown by the accompanying specimen,* was red, and its coats apparently injected; but there was no trace of any effused lymph upon its lining membrane.

A patient in St. George's Hospital had the femoral artery tied for an aneurismal tumour. He died at the expiration of thirteen days, secondary hæmorrhage having recurred several times. The artery had been tied with a silver wire, which had very nearly eaten its way through the lining membrane of the distal portion of the vessel. The indented outline of the lining membrane could be distinctly traced, and was quite free from any plastic effusion upon its surface. The tube was here partially closed by a decolorised coagulum, which had the slightest possible adhesion to the lining membrane; small portions also of the same material, near its termination, were loosely adherent to the same membrane.

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* The specimens referred to are now in the Museum of St. George's Hospital.

Again, in Pirrie's work on "Acupressure," a case is related in which, after an amputation of the thigh, bleeding was commanded by acupressure needles under and loops of wire over the vessels. The patient died thirty-six hours afterwards. The superficial femoral artery and vein were both included in the loop, and before the vessels were opened it could be distinctly seen that the artery contained a coagulum extending upwards from the needle for an inch and three-quarters, and that the vein was empty to nearly the same extent. The artery and vein were both free from any trace of inflammation, and their coats were perfectly entire and unimpaired where they had been embraced by the needle and loop. The obliterating coagulum in the artery was composed of three pieces adherent to each other and very slightly to the interior of the artery.

That the process by which an injured artery or vein is repaired is, as a rule, different from that which has hitherto been understood as *adhesive inflammation*, appears from the following observations:

I made an incision, about an eighth of an inch in length, through all the coats of the carotid artery of a horse, on October 29th, 1866. The artery of the leg was also opened in two places close together. On November 1st, three full days after the operation, the animal was killed, and the vessels were carefully removed and examined. Upon slitting up the vessel, a clot was discovered extending from the opening, two inches in one direction and about one inch in the other. This dark red clot could be traced into the almost colourless material which plugged up the opening that had been made in the vessel, but in no part whatever was it adherent to the lining membrane. A large quantity of blood had been effused into the areolar tissue forming the external coat of the artery, and had distended its meshes enormously, forming a firm mass more than half an inch in thickness, extending around the vessel for about two-thirds of its circumference. The coagulum occupying the wound in close contact with the divided elastic coat of the artery, was almost colourless, but in thin sections a few red blood-corpuscles could be detected here and there. Pretty equally distributed through it and at very short intervals, were bodies having all the appearance of ordinary white blood-corpuscles. This colourless fibrin-like substance, rich in white blood-corpuscles, adhered to the divided arterial coats with tolerable firmness, and it is even possible that by its contraction it may have drawn towards each other the lips of the wound. For the description of the pathological changes I am indebted to the courteous assistance of Dr. Lionel Beale, F.R.S., whose well known skill as a microscopist and eminence as a worker in physiological science, will afford the best guarantee of the value of the observations. In order to examine this rapidly-formed tissue minutely, in the hope of ascertaining precisely its nature and origin and the mode of its formation, that small portion of the artery where the opening had been made was removed, and after having been transferred to carmine fluid,* was hardened in glycerine containing a very little acetic acid. When in a proper state, thin sections were made so as to include the arterial coats and adventitious tissue adhering to the cut surfaces. These sections were examined by Dr. Beale under a magnifying power of 29 diameters, and other portions under a power of 700 diameters.

A laminated transparent tissue was discovered occupying the opening made in the artery three days after injury, by which the wound was temporarily repaired. It was clearly a point of great interest to determine what was the nature of this tissue, for in it the changes take place which result in the complete healing of the artery. After careful examination of the texture itself, and a consideration of various facts previously ascertained in other inquiries,—upon the formation of fibrin in the blood, the development of tissue, and the formation of lymph upon serous membranes in inflammation,—I have, says Dr. Beale, arrived at the conclusion that this adventitious tissue occupying the wound is closely allied to, though probably not identical with, ordinary fibrin, and is deposited from the blood, or rather is formed through the agency of the living germinal matter of the blood—the so-called white blood-corpuscles and corpuscles which have been detached from these.* Although there is a difference in the microscopical characters of ordinary fibrin deposited from the blood, and undoubted lymph formed upon the surface of a recent wound, or upon a serous membrane in inflammation, I think this difference may be due to the different conditions under which the deposition of the insoluble material occurs. At any rate I have seen fibrin undoubtedly deposited from blood, which exhibited no fibrous or "fibroid" appearance whatever—fibrin which exhibited delicate lines or striæ like lymph—and fibrin which could scarcely be distinguished from certain specimens of true fibrous tissue in process of development. And, on the other hand, I have seen specimens of unquestionable lymph recently formed upon the surface of the peritoneum which could not, I think, have been distinguished by its microscopical characters, or its behaviour with acetic acid or potash, from true fibrin.

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* For the composition of the carmine fluid, see "The Microscope in its Application to Practical Medicine," 3rd edition, 1867, p. 53.

Many facts lead to the conclusion that the formation of what is called fibrin, lymph, and fibrous or connective tissue, is due to the conditions present and the rate at which the changes proceed, rather than to a difference in the properties or powers of the living matter which produces these substances. Dr. Beale believes that the so-called colourless corpuscles of the blood, lymph, and chyle, and the corpuscles resulting from their division and subdivision, may give rise to fibrin, to lymph, or to fibrous tissue. In the formation of lymph, the small portions of living germinal matter known as white corpuscles or bodies derived from these which have escaped from the blood through the slight fissures in the walls of the overstretched capillary vessels, are the active agents. In all organizable exudations such masses of living germinal matter exist, and to these must be attributed the production of the material giving to the exudation its peculiar characters. If the substance be poured out upon the surface of a serous membrane, the germinal matter in it will live and grow, and continue to form a kind of fibrous tissue probably in consequence of being very close to the blood-vessels and receiving a supply of nutrient material. If on the other hand, the fluid holding in suspension masses of germinal matter be poured out upon a mucous membrane, which it reaches by passing first into some of the numerous glands or follicles opening upon its surface, the thick layer of epithelium which separates it from the blood-vessels will interfere with the free supply of nutrient pabulum. The germinal matter will die, and the mass can never become organized. In this case, although its origin and nature are the same, it is denominated an *unorganizable exudation,* to distinguish it from the former, in which it is called *organizable.* Whether it dies and is thrown off (unorganizable), or lives and becomes an integral part of the body (organizable), depends upon its position and its relation to the blood, not upon any peculiarities in the exudation itself. It cannot be admitted that an inflammatory exudation consists merely of a fluid holding *in solution soluble matters.* Small particles of germinal matter are invariably suspended in it, and although hitherto overlooked, these constitute the only active matter in the exudation.

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* "On the Germinal Matter of the Blood; with Remarks upon the Formation of Fibrin," by Lionel S. Beale, "Trans. Mic. Society," Dec., 1863.

Moreover, Dr. Beale's observations upon the changes taking place in the blood which has extravasated into the areolar tissue in the external coat of the vessels, seem to show that in the disintegration and removal of its lifeless elements, the white blood-corpuscles increase and multiply, and are in all probability actively concerned.

In one of the preparations obtained from the outer part of the vein, three days after it had been opened, the following changes are observed :—Multitudes of little granular cells are present in the areolar coat in the intervals between the fat cells. Already the colouring matter of the extravasated blood has in great part disappeared, and the fatty matter of the fat-cells is in many cases tinged by it of a deep brown colour. The little bodies, like white blood-corpuscles so very numerous, were evidently multiplying rapidly when the specimen was removed from the body of the animal. Here and there the remains of red blood-corpuscles could be discerned, pale, and indistinct. That the corpuscles consisted of living germinal matter, and were not altered red blood-corpuscles, was evident. For, first, they were readily coloured by carmine fluid; secondly, they varied much in size, and were evidently multiplying; and lastly, they were spherical, exhibiting nuclei in their interior, and had that delicately granular appearance so characteristic of the white blood-corpuscle, pus-corpuscle, and other bodies composed of living germinal matter. It is most improbable that these masses of germinal matter had been derived from the connective tissue corpuscles; for, first, the latter were not found to be larger than in the normal state, or to exhibit any appearance of proliferation, nor were the bodies in question more numerous near the connective tissue corpuscles than in other situations. Secondly, they were so very numerous that it appears most improbable that they could have resulted from proliferation of the connective tissue corpuscles in the time. On the other hand, their general characters, their number, and the mode of their distribution, are such as we should expect to find if they were the descendants of white blood-corpuscles which had escaped from the vessels with the blood, and being freely supplied with nutrient pabulum in consequence of their proximity to capillary vessels, had grown and multiplied.

Let us now pass on to consider more particularly how the material closing the opening in the wounded artery was produced. The facts observed by Dr. Beale and myself seem to prove that it was formed from the blood flowing in the vessel. It appears to us that it could not have resulted from changes in an exudation poured out by the vasa vasorum, for the quantity of coagulated blood in the external coat of the artery must have so compressed these vessels as to have prevented circulation through them. And even if blood flowed slowly through them it is not easy to understand by what means the exudation could have passed through the very thick coagulum, and have reached the lips of the wound. Neither is it reasonable to infer that the lymph-like substance resulted from an exudation poured out by the elastic coats of the artery itself, for, in the first place, it must be remarked that the elastic tissue of an artery is not a texture which yields coagulable lymph; secondly, the lymph-like substance covered for some distance from the wound the lining membrane of the artery which was uninjured as well as the cut surfaces; and thirdly, the material in question passed gradually into decided blood-clot. Nor is Dr. Beale disposed to regard this as a substance formed by the nuclei or masses of germinal matter of the elastic fibres or of the muscular fibres of the arterial tunic (although these are much more numerous than represented by anatomists), for in the specimens in question they were only slightly larger in the neighbourhood of the injury than in other parts of the artery, while we know from other observations that where new growth is the result of the increase and division and subdivision of the germinal matter of the normal texture, vast collections of germinal matter can be traced to these bodies. In one specimen, some of the portions of germinal matter of the artery are seen to project from the divided coats, but the corpuscles in the lymph are separated from these, and there is nothing to lead us to infer that the latter have in any way descended from, or originated in, the masses of germinal matter or nuclei of the arterial tunic. On the other hand, the corpuscles in question exactly resemble those found in ordinary fibrin, and they are scattered pretty evenly through the new tissue, just as we should expect if they had been derived from the blood.

With the help of these facts, we may now attempt to describe, in the order of their occurrence, the phenomena which we think occur during the first three or four days after an opening has been made in an artery in cases where the injury is repaired. If the free escape of blood from a small wound made through all the coats of an artery be prevented by closure of the external wound, clots are of course formed in the areolar tissue and among the other textures external to the vessel, and thus the escape of blood gradually ceases. In our specimens the blood in the areolar coat of the artery was found to extend for some distance from the seat of the injury.

The opening *in the elastic coat of the vessel* is not, however, immediately occupied by blood, but, as has been shown, is gradually filled up with a perfectly colourless substance. This material, which resembles the fibrin found in some aneurismal sacs, is, like that substance, deposited from the blood, layer after layer, until the space is filled up. Sometimes the process continues until an actual elevation, projecting above the level of the inner surface of the artery, is formed.

It is evident, from their arrangement, that the thin laminæ of transparent fibrin have been formed from the blood which flowed along the vessel, and not from any material poured out from beneath by the vasa vasorum or from the arterial tissues. We do not, however, regard the material as a mere deposit of fibrin from the blood, but are disposed to think that it is formed by the agency of the white blood-corpuscles, which we know would adhere to the surface of the blood-clot which occupies the lower part of the wound. It seems probable that these masses of germinal matter, as they slowly move over the surface, form the material allied to fibrin.* This substance, it must be remembered, has been produced within three days, and yet it exhibits a certain definiteness of arrangement. It adheres imperfectly to the surface of the artery, but firmly to the comparatively rough lips of the wound, and by its slow contraction it no doubt draws these towards each other. Thus we believe is formed, layer after layer, a temporary tissue, which, backed up as it is by a thick clot, is strong enough to resist the ordinary lateral pressure of the blood.

The subsequent changes taking place in this fibrin-like material which result in the permanent closure of the wounded artery have not yet been investigated. Dr. Beale and I feel convinced, however, that by the method of research we have adopted, it will be possible to determine whether the new fibres which enter into the formation of the new permanent fibrous tissues, result from the masses of germinal matter (white blood-corpuscles) of the temporary adventitious tissue described by us, or from those (nuclei) belonging to the normal texture of the artery which may gradually increase in number near the cut surface of the vessel, and thus extend from this point into the temporary texture occupying the wound. There is, however, no doubt that masses of germinal matter which are the direct descendants of white blood-corpuscles do possess remarkable formative power, and observations made some time since by Dr. Beale render it almost certain that white fibrous tissue and epithelium may be formed by these. There are reasons for thinking that yellow elastic tissue may likewise, under certain conditions, result, while it is certain that the higher tissues, such as organic muscle and nerve, never originate from these bodies.

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* With reference to these supposed movements, see a paper "On Contractility as distinguished from purely Vital Movements," by Dr. Beale, "Mic. Journal," July, 1864; also, "The Microscope in its Application to Practical Medicine," 3rd edition 1867, p. 63.

LECTURE IX.

ON MORTIFICATION AND OTHER AFFECTIONS SECONDARY TO DISEASE OF THE ARTERIES.

IN the last lecture we considered the process of repair that is instituted when an artery is injured, and found that this process is conducted by means of a material deposited from the blood, closely allied in its nature to ordinary fibrin. In this adventitious substance may be seen under the microscope, as has been so well illustrated by Dr. Beale, a number of granular cells undergoing subdivision and multiplication. These cells in their characters resemble the white corpuscles of the blood, and cannot, in fact, be distinguished from them. We considered the fact that the material thus deposited in the healthy process of repair became organized, but that in certain states of disease it might not become organized, and that then it was liable to become removed in the current of the blood. The principal object of the present lecture is to trace some of the effects which may be thus produced.

The two processes, which can be traced in the repair of blood-vessels, bear an analogy to similar actions which are more easily observed on the surface of the body. The material effused between the cut edges of a wound in the skin may be completely organized, so as to remain a part of the living tissue; or, on the other hand, it may be thrown off as unorganizable matter. In the latter case the quantity of new material generated is very much greater than in the former. The matter thus formed by the multiplication of cells on the surface of the body, and not organized, is thrown off in the process of suppuration; but the products of any analogous actions in diseases of the vessels are liable to be poured into their cavities. If the process of repair in an artery is accomplished by the first intention, only so much new material is deposited as may be requisite; but if the repair by the first intention be not accomplished, then other actions take place which may lead to the obstruction, more or less complete, of the vessel.

The morbid products may then mix with the blood, which has a tendency to carry them in the course of the circulation. The quantity of material thus formed, either by the subdivision and multiplication of adherent cells, or by the direct deposit of fibrin from the blood, is often very great; so that the cavities of the largest as well as of the smallest vessels may become closed by this means for many inches. The number of cases in which veins are obstructed in this way is sufficiently numerous and of constant occurrence; but the instances in which arteries are similarly affected are comparatively rare.

When any matter is thus deposited in a diseased vein, and does not remain adherent, either directly or indirectly, to the sides of the vessel, we naturally look for the results of its being carried in the course of the circulation to some secondary effects in internal organs: when an artery is similarly affected, we as naturally should look for analogous results in the parts to which the ultimate subdivisions of the artery are distributed. It does not, however, often happen that the cavity of an artery becomes obstructed by the fibrin-like material above mentioned, independent of other disease. In wounds of arteries which do not unite by first intention, if a large quantity of this material is deposited, it is not generally in the interior of the vessel. In the usual course—at least in the human subject—an aneurism forms, and the fibrin then is deposited outside the vascular system. But there is a class of cases which does not appear to have hitherto attracted much attention, in which the products of other diseased actions may find their way into the interior of arteries; and it is to these that I would now particularly refer. The changes in the arterial coats themselves have indeed been well observed; but the secondary effects produced by the entrance of the products of these diseased actions into the circulation have not been satisfactorily traced.

Dupuytren believed that spontaneous, senile, or dry gangrene was due to inflammation of the principal arteries of the affected part; and that the blood coagulated in the cavities of these vessels, either in consequence of its being in contact with the inflamed lining membrane, or from its admixture with coagulable lymph, or as a result of ulceration of the internal coats (" Leçons Orales," t. iv. pp. 249-50).

Sir Benjamin Brodie has recorded a case of mortification from what he believed to be inflammation of the principal vessels of a limb : " From the bifurcation of the iliac trunk down to the middle of the thigh the artery was obliterated, being completely filled with coagulable lymph, evidently effused from inflammation " (" Works," vol. iii. p. 372).

If the account above given of the mode in which arteries and veins ordinarily become obstructed be correct, the process is one in no way necessarily connected with inflammation ; and if the coats of the vessels are at all inflamed, it is as a secondary consequence of actions within their cavities. The matter which obstructs the vessels is in no sense a secretion, but is formed by a deposit directly from the circulating fluid, or by the subdivision and multiplication of cells resembling the white corpuscles of the blood, and of matter formed by these cells. In chronic states of disease the changes observed in the coats of arteries consist chiefly of steatomatous or atheromatous deposits. These deposits are liable to become softened, and when the lining membrane of the vessels gives way, this softened material is poured into the current of the circulation. The blood in a diseased artery then becomes mixed with a material (in process of degeneration) really derived from the arterial tissues.

Lebert describes the pultaceous softening of atheromatous disease of arteries, on microscopic examination, as of a yellowish-white colour, containing molecular granules, vesicles, granules of fat, crystals of cholesterine, calcareous granules, and débris of the elements of the middle coat ("Anatomie Pathologique," p. 513).

Now Gaspard has experimentally proved that fatty matters will not readily pass in the current of the circulation. Some fluids, indeed, as demonstrated by Majendie ("Précis Elémentaire de Physiologie," tom. ii. p. 389), pass readily from the arteries into the veins; but others are obstructed in their passage. Clear solutions of tartar emetic, of opium, or of nux vomica, as shown by Gaspard, pass readily in that way, and little or no irritation is produced in the vessels through which they are conveyed. But other substances, such as the infusion of tobacco, the solution of acetate of lead, or putrid fluids, when injected into the artery of a limb do not readily pass through the capillaries; and then the local irritation is great. That which may be thus illustrated by physiological experiments, may also be observed in practice, although the opportunities of so doing may be of rare occurrence. In the first of the following cases the diseased product from the internal coats lodged in the large arteries in which it was formed, in arteries of intermediate size, and in the capillaries. In the second case it lodged in the capillaries only.

Case I.—M. D., æt. 50, was admitted on the 24th July, 1867, into St. George's Hospital, under the care of Dr. Ogle. There was then a tumour on the right side of the navel, which had existed, as far as she knew, two months. On the 6th of August the toes of the right foot became affected with gangrene. There was a good deal of pain in the ankle and toes. There was then no œdema.

In the beginning of October a fresh swelling appeared in the left inguinal region, and in a few days the left leg became œdematous. I was now requested to see her in consultation with Dr. Ogle, and concluded that, as the gangrene had occurred on the opposite side to the swelling, it depended on some disease of the arteries, and not upon obstruction to the veins.

The patient died on the 29th of October. Upon a post-mortem examination, the liver and kidneys were found fatty. In the right iliac region was a large hard firm mass about the size of a fœtal head, which lay somewhat obliquely across the abdomen, resting on the right iliac artery just after its bifurcation. It was found to be a cancerous mass, hollow, and full of fæces. In the left iliac fossa was a similar malignant deposit, the size of an egg, and closely adherent to the bone. The inguinal glands on this side were likewise enlarged, and one gland, the size of a walnut, pressed upon the femoral vessels as they passed under Poupart's ligament. The deposit in these glands was of the same nature as in the tumour on the right side of the abdomen. The aorta was in several places much diseased; large deposits of atheroma, as big as a sixpenny-piece, were found all over its surface. On the lining membrane were some oval flattened masses the size of large peas. Some portions of these were of a dark-red, others of a bright-red colour; and one lay completely detached. There was no trace of inflammation of the lining-membrane of the vessel. The right popliteal artery contained a long decolorised mass of fibrin, in which two of these red masses were embedded. This fibrin adhered firmly to the vessel at one part by a broad membranous band. The canal of the artery was, however, pervious. All the veins in the left lower extremity were full of decolorised clots, which were adherent. The posterior tibial veins on the right side were also plugged. The nature of the oval masses found in the interior of the vessel formed the chief point of interest in the case. They all presented a shining lubricated exterior, and adhered, with one exception, tolerably firmly to the coats of the vessel. A delicate membrane, apparently continuous with the lining membrane of the artery, could be traced to a greater or less extent over their surfaces. Upon a microscopic examination, these masses were found to consist of blood and altered fibrin, and of fatty matter.

Case II.—C. D., æt. 55, was admitted into St. George's Hospital under my care on the 5th December, 1866. He had at that time a sloughing ulcer, about three inches in extent, nearly surrounding the lower part of the right leg. He attributed the ulcer to a bruise which he had had a month previously. The patient was depressed, with a full, weak pulse, which sometimes intermitted. The cause of his depression was carefully looked for, but no evident sign of disease of any of the internal viscera was detected. With slight variation, the ulceration continued, and exposed a portion of the tibia; and the patient died on the 2nd of January, 1867.

Upon a post-mortem examination, the body was very fat. The lungs were much congested. The heart was very large, weighing twenty-four ounces. The valves were very atheromatous, and quite rigid. The aorta was covered with patches of atheroma the size of a threepenny-piece; some of these patches were softened and broken down in their centres. Where this had taken place, ulcers with ragged edges were left surrounded by congestion. The liver was congested and fatty; the spleen diffluent, and its structure broken down. The kidneys were large and coarse, and their structure rotten. The arteries of the right limb were examined, and found to be rigid, and considerably changed by atheroma. Small shreds of fibrin, more or less firmly attached, were found on the surface of the ulcers in the aorta.

It has been generally, and perhaps too hastily, assumed that mortification in cases where the arteries are diseased depends upon a want of a sufficient supply of blood to the part. In Case I, above recorded, we find the circulation partially arrested by adherent coagula in the aorta, the popliteal artery all but impervious from the same cause; and the circulation completely arrested in the distal portion of the limb. But do the facts justify the inference that mortification took place from want of blood? In cases where the supply of blood is suddenly arrested the part becomes pale and cold. The very reverse of this is generally observed in cases of mortification in connection with disease of the arteries. Thus in a case related by Mr. Turner in the "Transactions of the Medico-Chirurgical Society of Edinburgh," vol. iii. p. 138, in which the circulation in the forearm was arrested in consequence of an accident, "the fore arm was pale, and the veins much smaller and more collapsed than those in the other arm; and when they were compressed they filled slowly."

Mr. Chevalier has recorded a very interesting case of the same kind in volume xiii of the "Medico-Chirurgical Transactions." A gentleman received a very severe blow from the shaft of a van in the left groin. This was followed by great pain in the leg and foot. The day following he had lost all sensation in the lower half of his leg. There was no pulsation in the arteries of the injured limb, the skin of which was "pale and cadaverous." After some time the ankle and foot assumed a deep transparent colour not unlike that of new mahogany. This did not disappear upon pressure. The toes were dried and shrunk; they were paler than the ankle, and their substance was transparent; they resembled parts dried and immersed in turpentine. The cuticle did not separate. The temperature of the right toes in this case was 90°, that of the left toes varied from 66° to 71°. On a post-mortem examination the arteries were all found to be impervious in the neighbourhood of the original injury.

Mr. J. A. Gamgee has also related the case of a woman eighty-five years of age, who suffered from gangrene of the foot. The foot in this case had never been black, but was of a dirty-white colour. The popliteal artery of the corresponding side was found obliterated by a firm, adherent, whitish clot. The anterior and posterior tibial arteries were also closed by white adherent clots.

In contrast with these cases, the appearances presented by the great majority of cases in which mortification has taken place in connection with disease of the arteries show that the affected parts have contained much more blood than natural. The blood has stagnated in the capillary vessels, and has been altered in colour and consistence. It has been defective in quality, and not in quantity.* As cases present themselves in practice, various adverse influences may doubtless be brought to bear upon a part at the same time. Thus the circulation through the arteries may be impeded by the formation of coagula in their channels: the return of blood through the veins may be retarded by local pressure, and the quality of the blood may be altered at the same time. All these influences may have their part in the production of mortification in any given case, and may have been in operation in Case I, above related. But the alteration in the constitution of the blood and the consequences of that alteration, appear to me by far the most frequent and the most effective causes of mortification. In Case I, we have portions of blood coagulated in contact with the diseased lining membrane of the aorta. These coagula were covered with a shining membrane, and adhered to the aorta. Considering the force of the circulation through the vessel, we can come to no other conclusion than that they were formed *in situ;* and being formed upon the diseased lining-membrane, or where that membrane was deficient, it is in the highest degree probable that they contained some of the products of the diseased actions which had taken place. Those diseased products may indeed have been the efficient cause of the coagulation of these portions of blood. At all events, the existence of these coagula, as they were found, proves that coagulation of blood may take place in living vessels; and that the coagula thus formed may have a firm adhesion to the sides of the vessel or may be independent of them. The tendency to coagulate must have been very powerful where the effect could be produced under so many disadvantages as in the aorta. It is not therefore surprising, that the same tendency should produce a greater result in more favourable situations. Accordingly we find in the case referred to, where the arterial tubes were smaller, where the impulse of the blood was less, and where the artery subdivided into several branches, that much larger coagula were formed. When these several conditions are present in a still greater degree we find many vessels obstructed instead of one, and the circulation of the part completely arrested.

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* That the quality of the blood alone, independent of any disease of the arteries, may produce mortification, is illustrated by the following case:—

A patient was admitted, under my care, into St. George's Hospital, with a child that she was suckling. The patient subsequently had an attack of erysipelas. The child then for the first time became poorly, and the skin of the whole of the toes, and of a large part of the foot, mortified. The toes separated naturally, and the wound healed. The child afterwards continued in perfect health.

Independently, however, of the obstruction of the circulation by coagulation of the blood, there are other circumstances with regard to the blood itself which tend to prevent its passage through the smaller capillaries. Thus fatty matters, as has been shown, pass through the capillaries with difficulty, causing pain and swelling. The products of the degeneration of the coats of arteries are chiefly fatty, and when these mix with the blood, we have the conditions presented which so very frequently accompany, if they do not produce, senile gangrene.

When cell-growth takes place in portions of fibrin deposited on the lining membrane of an artery, that growth may continue for a certain time quite independent of any action in the membrane with which it is in contact; and when the material in which such cell-growth has commenced is detached from its original position, that growth may still continue in the distant parts to which the material containing these cells is transferred,

In Case I, the coagula in the aorta were covered with a thin lubricated shining membrane. The mode of formation of membranes on the surface of coagula of blood in serous membranes was first pointed out by Mr. Hewett, in a paper in the "Medico-Chirurgical Transactions" (second series, vol. x. pp. 45-82). The way in which membranes are formed on the surface of coagula in blood-vessels appears strictly analogous to the process which Mr. Hewett has described. A process of organization in both cases goes on quite independently of any actions in the neighbouring parts, or of any blood-vessels which they may contain. This tendency of the fibrin, when deposited from the blood, to organize itself by multiplication and subdivision of its cells, may continue after it has become detached from its original site; and we may thus have the elements of abnormal growth and development conveyed to a distance. Pain, swelling, softening of parts, and mortification may thus be produced by diseases originating in the vessels which supply a limb, and at a distance from the part where the effects of those diseases first manifested themselves. It is very difficult to prove in any individual case that such a translation of disease has occurred, because it is manifestly impossible to examine the parts both before and after its occurrence; but where such evident results present themselves as in the cases recorded, it must necessarily happen that less severe affections should occasionally occur.

The mildest form of disease which I have witnessed, and which I have considered of this nature, is an affection resembling a very painful soft corn. The cuticle over the part becomes ragged, and when removed the cutis shows several small black spots. The disease occurs in a part not subject to pressure, and continues several days without alleviation of the pain or tenderness. I have noted it particularly on two occasions, and both times it presented itself in young people on the bulbous extremity of the little toe.

The following case affords an instance of very extensive softening of the pancreas and of other organs in connection with disease of the aorta.

J. P., æt. 53, after a long previous indisposition, was suddenly attacked with violent pain in the back and loins. He apparently fainted from the effects of the pain, and did not recover.

Upon a post-mortem examination, the body was found loaded with fat. The omentum alone weighed more than a pound. The anterior and posterior edges of the right lobe of the liver both presented a discoloured patch. These patches were black in the centre, and gradually assumed a lighter shade towards the circumference, where the tissue of the liver appeared as if it had been dusted with gunpowder. The pancreas was almost entirely disorganized; a small portion, about the size of a Windsor bean, only remained connected with the duct on the right side. This retained its natural structure. The remainder, of a saffron-colour, presented a gelatinous mass, in which the duct terminated at about what would have been the junction of the middle third of the gland with its head. The inner coat of the gall-bladder was firm and rigid; the outer coat was very flaccid, and the two were separated by a gelatinous fluid. The capsules of the spleen and left kidney were filled with matter of the colour and consistence of black currant jelly. The left kidney presented two cysts, containing together from ten to twelve ounces of fluid. The diaphragm, where it lay in contact with the spleen, was softened so as to be lacerated with very slight force.

The walls of the left ventricle of the heart were twice their natural thickness, and softened so as to be easily broken down by the finger. There was a small rim of bone between the right auricle and ventricle. The aorta-valves were not ossified, but on passing the finger into the aorta from the heart, a plate of bone, loosely attached, was separated. This led to a further examination of the aorta, which presented from the termination of the arch to the bifurcation a complete column of bone. Between these points spicula of bone radiated from the circumference towards the centre of the vessel. The pancreas and the gall-bladder in this case were affected in a very different way to the liver, spleen, and kidney. They presented no black deposit, and appeared simply softened.

It must be noted in this case, that the diseased appearances followed exclusively the distribution of the branches of the cœliac axis and of the renal arteries. The theory of a *materies morbi* being conveyed through the blood can alone account for the simultaneous appearance of disease in such different parts. The case occurred many years ago, and the examination was conducted in a private house. No specimen could be preserved, or further details of the case would be given.

It is unnecessary to dwell upon the analogy between the process of softening in connection with diseases of the arteries of other organs, and the affections of the brain from the same cause, so ably pointed out by Dr. Kirkes. In both cases, however, I consider the changes observed to depend rather upon an alteration in the quality than the quantity of blood supplied to the parts. In an organ in which the anastomoses of vessels are so free as in the brain, it could hardly happen, while the quality of the blood remained unchanged, that the arrest of the circulation through one large vessel should affect exclusively any one part of its structure.

Another form of disease following the distribution of particular arteries has attracted my attention. It is a strictly local affection, confined generally to one limb, and attended with very little, if any, constitutional disturbance. It commences with small circumscribed swellings in the cellular membrane. The skin over these remains for a time of its natural colour. It becomes red, and subsequently livid. It then ulcerates, and some thick fluid that has formed underneath is discharged; the skin is now left undermined, with irregular livid edges. The patient may go about his occupation as usual, and appears to suffer very little in his general health; and were it not for the pain which he sometimes experiences, would be little inconvenienced by his malady. These abscesses are of very slow development; and as some heal, others will make their appearance; and thus the disease may continue for years.

These abscesses will form in considerable numbers; each being separate and distinct from the others. When healed they may present the outline of a bunch of raisins flattened, the circumference of each separate patch encroaching more or less on its neighbours. They are generally accompanied with some swelling of the limb; and in one case this swelling attained a very considerable size. From the local nature of these tumours, from their chronic character, from the number of places simultaneously affected, and from their tendency to suppurate, I have ventured to call them "CHRONIC LOCAL MULTIPLE ABSCESSES."

CASE. III.—E. S., a young man, came under my care on the 2nd of January, 1866. On the outside of the leg corresponding to the distribution of the branches of the fibular artery were several irregular sores, covered by a gray phagedænic surface, and discharging a thin serous fluid. Portions of the neighbouring parts were enlarged with solid œdema. The edges of the ulcers were undermined and livid. In some parts obscure fluctuation could be felt under portions of skin very little altered in appearance. Other parts, where no fluctuation could be detected, felt "boggy." The affection had at that time lasted nine months, and he had tried a great variety of remedies.

This patient remained under my care during the years 1866 and 1867; a variety of treatment was adopted during that period. The only remedy which appeared to produce any decided benefit was the local calomel-bath. This he commenced when I first saw him, and resumed on several subsequent occasions.

It was not, however, until the end of 1867 that the leg appeared permanently cured. On the 28th of February my patient wrote to me stating that his leg "appeared to have recovered its natural power, and felt in walking almost as strong as ever."

In this case there was a history of specific constitutional disease. In the following there was, however, no such history.

Case IV.—Ellen S., æt. 32, was admitted under my care into St. George's Hospital on the 3rd March, 1868. She was married, and had four healthy children, the youngest five months old. On the outside of the left leg were a number of small round ulcers, presenting phagedænic surfaces, with livid undermined edges. The affection commenced two years previously, with a small swelling on the lower and outer part of the popliteal space. This increased gradually and slowly, and attained its full size a year ago, after which it subsided. The present ulcers had been in existence twelve months, and had become at times sufficiently painful to prevent her walking; there was no swelling of the foot.

This patient's history was carefully examined into, and no cause for the ulcerations could be found beyond the swelling in the popliteal space above mentioned.

The ulcers rapidly improved under local calomel fumigation repeated twice daily; and the patient left the hospital on the 1st of April.

Case V.—Mrs. L., æt. 44, came under my care on the 12th January, 1868. She had had one miscarriage soon after her marriage nineteen years ago; and had not been regular for two years. When first seen, the leg and foot were swollen to about double their natural circumference. The swelling was caused by solid œdema. Ten or twelve ulcers in different stages of development existed down the outside of the left leg. Three ulcers in this case existed also upon the inside of the leg. The knee was contracted. Extensive induration occupied the popliteal space. She had been unable to walk for several weeks, and was apprehensive that she would not regain the use of her leg. The affection had commenced nine months previously; a small red lump then appeared over the head of the fibula. This was soon followed by swelling in the popliteal space and over the ankle. Small circumscribed oval tumours then formed in different parts. These in process of time became softened, and discharged a thick pus of the consistence and appearance of softened cream-cheese.

The treatment consisted of local calomel fumigation morning and evening, the application during the day of a lotion of sulphate of copper, and a carefully-applied bandage. Iodide of iron was given internally. Fresh abscesses, containing the same cheesy fluid, were opened on the 18th and 28th of February. The ulcers now all began to heal.

At the latter end of March the leg was reduced to about its natural size. The ulcers had all nearly healed, and the patient was able to walk.

September 3, 1868.—This patient called to show herself. The leg was now nearly straight. She could walk for half-an-hour. The ulcers all remained apparently permanently healed, with the exception of one spot the size of a pin, which still secreted some pus.

It may be noted that in this case the ulcers existed on the inside as well as on the outside of the limb, and that the swelling affected the foot as well as the leg. It is possible, therefore, that the tibial and fibular arteries both had to do with the production of the disease in this case ; and that the fibular artery alone was implicated in Cases III and IV, where the swelling was confined to the leg. Although the peculiar local symptoms which I am attempting to describe may, from their following the tracks of particular vessels, be supposed to depend on some disease either originating in those vessels, or communicated to them from neighbouring parts, yet it by no means follows that they may not have a constitutional origin. In the following instance the disease appears to have been communicated. The history is, however, by no means so satisfactory as might be desired; nor had I the opportunity of carrying out any systematic plan of treatment.

Case VI.—During the latter part of the year 1866 and in 1867, I saw, in consultation with Dr. Quain, a lady who had for several months suffered from a number of small circular ulcers on her leg. These, as in the former cases, commenced with indurations in the cellular membrane. The skin covering them after a time became implicated. It would gradually become thin and give way; but previously to this, and even before the skin became discoloured, fluctuation could sometimes be detected in the subjacent parts.

The disease in this case was most obstinate, and a number of medical men were consulted, without, as far as I know, any decided benefit. The point of interest in the case is, that the husband had what appeared from description to have been, a similar affection some time before. The disease in him was also most obstinate, and the ulceration very extensive. He described a place in his leg that he could "put his hand into;" but this appears to have given him little inconvenience, and not to have interfered with his general health, as he hunted with it for a whole season. After his leg got well, which it seems to have done without any particular treatment, the scalp became affected. This affection, which I had an opportunity of seeing, was also most obstinate. Several small circumscribed abscesses, surrounded by induration, were opened at the same time, discharging a large quantity of pus. These abscesses in places extended under portions of skin very little altered in appearance. This condition continued during many consecutive months. The patient's general health during the time was unaffected.

The conclusions which I would draw from the foregoing observations may be thus summed up. The morbid products of diseases of the arteries (whether originating in them or communicated to them from other parts) may mingle with the blood. These morbid matters consist chiefly of the results of fatty degeneration, and of fibrin-like matter formed in the vessels. Such products, mixed perhaps with the débris of the arterial tissues, may impede the circulation, either mechanically or by inducing coagulation of, or deposit of fibrin from, the blood. The tendency to this deposition of fibrin, and the process of cell-development which may commence in such deposits in one of the larger arteries, may be continued to a much greater extent in the capillaries. The actions in these are essentially of the same nature as in the larger vessels, although the material in which they occur may have been transferred from its original site. The principal secondary effects which I am inclined to attribute to the causes now mentioned are (1) gangrene, (2) softening, (3) solid œdema, and (4) chronic local multiple abscesses.

ORIGIN AND TREATMENT
OF
SOME DISEASES OF THE RECTUM.

LECTURE X.

THE simplest disorder to which the general structure of organs is exposed consists in vascular congestion. The rectum is especially prone to it, owing to the dependent position of the part, and to the more or less acrid and heating nature of its contents and secretion, as constant causes; while it is obvious that no general congestion can occur in the abdominal circulation, either through increased flow of blood to the stomach and bowels, or through obstruction of the portal system from any of the various circumstances that continually produce these results, without filling and distending the hæmorrhoidal vessels. In the female sex, the close connection of the rectum with the uterus renders it again liable to periodical congestion by contiguous sympathy; and during pregnancy, the return of blood from the part is directly impeded by the pressure of the gravid uterus.

Accordingly, no organ exhibits such a variety of morbid phenomena, attributable directly to congestion, as the rectum. These may be referred to three heads. The first consists in vascular fulness alone, attended by sensations of heat, itching, weight, aching; at first local, afterwards extending round the hips, and down the thighs. Of these sensations, the most troublesome from its severity and permanency, is that of itching. Where it is most acute, the texture of the skin becomes capable of sudden injection, and acquires the *habitude* of almost erectile tissue.

The second order of congestive phenomena comprises the production of growths, through a modified hypertrophy, dependent on the heat and afflux of blood. These growths present the form of single or clustered tumours, the interior of which consists of hypertrophied cellular tissue, involving in certain situations, folds of varicose hæmorrhoidal veins. These tumours, called piles, are met with externally around the anus, are liable to form within the outer fibres of the sphincter, but are most common within the intestine. Their characters vary in different situations, but in all they are liable to continual variations in their state. Originally the result of congestive action, when that subsides they are often free from sensation, and pass unnoticed by the patient; but they are ready at any moment to become angry, to increase in size, and to participate in the uneasiness attending the first kind, or simple congestion.

The third set of congestive disorders of the rectum comprises the varieties of hæmorrhoidal bleeding. There are four great features predicable of congestive hæmorrhage: it may be vicarious, it may be periodical, it may tend to the relief of general or local plethora, it may be simply debilitating.

1. Hæmorrhoidal bleeding is seldom vicarious. It is almost a normal phenomenon indeed in certain persons, and instead of having to divert it back to another channel, it is sometimes an object to bring the disorder back to this part; as for instance when there are threatenings of apoplexy after the suppression of hæmorrhoidal bleeding.

2. Consistently with the position in which the preceding remarks place hæmorrhoidal congestive bleeding, it is occasionally periodical. But this is a phenomenon confined to the male sex. It is not so frequent in England as abroad. In Russia it is of common occurrence. Such a strange function it is obvious rather requires regulation than suppression; or the latter can only be thought of in connection with an entire change of habits in the patient.

3. As a vent to general or local plethora, hæmorrhage from the rectum is of some moment, and is not to be hastily suppressed by art, till it is clear that no other organ will become embarrassed by its arrest. In four cases out of five, however, it is an overloaded abdominal circulation which is availing itself of this vent, and in that case, by combining a change of diet with the use of mild aperient medicines, the employment of means for directly suppressing the bleeding is allowable. In countries where the habits of the people involve less exercise than those of the English, and at the same time food is taken in abundance, this form of constitutional relief may be of great avail, whatever local ail-

ment or general disease the patient may labour under.

4. Hæmorrhage to excess is, commonly, primarily the result of congestive plethora, which has afterwards been kept up by relaxation of the vessels, and in some cases by an attenuated state of the blood; directly lowering, it is especially apt to affect the nervous system, and may connect itself with a variety of anomalous and unexpected pains in remote parts of the body, such as spasmodic disorders, or hysteria.

It is obvious, from the simple enumeration of the phenomena and consequences of congestion, to how great an extent disorders of the rectum must be amenable to simple general treatment, consisting, namely, in regulated diet, exercise, ablution of the part with tepid or cold water, joined with continual attention to the due action of the bowels. Were these points regularly attended to, more than one-third of the whole number of hæmorrhoidal attacks would never occur; as it is certainly found in practice that as large a proportion, as has been stated, admits of being thus cured. But business and pleasure stand in the way of good resolutions, and in the doubtfulness of the event, men too often take their chance.

The phenomena of inflammation, which develop themselves in these parts, are perhaps of an insignificant character pathologically, but in practice they are often extremely troublesome; for inflammation seldom manifests itself except in the form of indolent phlegmon of the cellular tissue, occurring for the most part in persons whose vigour and stamina are in some degree undermined. As a class, London tailors are especially liable to this form of hæmorrhoidal affections.

Every now and then this form of disease puts on an acute and graver character, and small or extensive phlegmons, in the immediate proximity of, and connecting themselves with the rectum, occasion alarm from the attendant irritative fever or some casual complication.

In general, the phlegmon becomes an abscess before it is troublesome to the patient, and then only annoys him because it is slow to heal, and forms a sinus, with a disposition to extend and to multiply itself, burrowing in the lax cellular tissue around the rectum.

These cases present many varieties : fistula, with one opening, which may be either external or into the rectum ; fistula, with both an external and intestinal opening ; the two conjoined ; fistula of the rectum combined with urinary fistula.

The treatment of these cases is almost wholly local and mechanical. But regard must be had to the general state of the patient, who, as it has been mentioned, is generally in the reverse condition to that which occasions congestive disorder. The latter commonly has to do with plethora and strength, the other with temporary weakness or an undermined constitution. To reduce and cool the system is the common indication in the one case, to correct and invigorate it in the other.

Malignant growths are a too common occurrence in the rectum. Incurable, they yet admit of great palliation—their diagnosis is important, but the rules easy.

After the broad physiological divisions of congestion, inflammation, morbid growths, the remaining features of hæmorrhoidal disease have a narrower and more purely mechanical character.

The sphincter ani is liable to irritability, spasmodic action, rigid permanent contraction ; to become irritable from soreness and ulceration of the membrane covering it; to be hypertrophied, and to oppose too much resistance to the parts above; to lose its expansile freedom, the anus then becoming a narrow rigid aperture. On the other hand, the sphincter is liable to be paralysed wholly or incompletely. The intestine itself is liable to displacement, either its mucous membrane alone being thrust out in hypertrophied folds, or the entire intestine being inverted, like the finger of a glove.

The intestine, like the other mucous canals, is liable to stricture, which is sometimes purely spasmodic, and in other cases has the character of a permanently indurated ring.

Finally, the rectum is liable to obstruction from the inordinate accumulation of fæces, to disturbance or lesion from foreign bodies, to laceration in labour, or it may have been originally incomplete and imperforate, or open by a wrong vent.

Of Inflammation of the Rectum.

The phenomena of inflammation which manifest themselves in connection with the rectum are referable to the two heads of erysipelas and phlegmon. Each presents remarkable subdivisions.

Erysipelas in this locality, as elsewhere, most frequently proceeds from an outward cause acting on a bad condition of body. The ordinary form of the attack is cutaneous. There is but trifling swelling of the cellular tissue. The skin is thick and heated, the redness ending at a defined irregular line, which rapidly extends itself. It is most frequently caused by piles which have become angry by imprudence on the part of the patient, or have been injudiciously disturbed by the surgeon. There is nothing special in the features of erysipelas occurring here ; nothing special in its treatment.

Perfect quiet, the recumbent position, a diet of broth, the bowels relieved by a saline laxative, tepid fomentation, tepid bread and water poultices frequently changed. If there should be much heat, some swelling, brawny hardness of the swollen perinæum, a strong phlogistic disposition about the part, a longitudinal incision parallel to the raphe, an inch to an inch and a half in length, is required. Where there are heat and tension combined, incisions—sufficient but not too extensive—are eminently beneficial. The part is sensible of speedy relief, and feels cooler and freer from tension.

In phlegmon it is the exact reverse ; prematurely cutting into a mass of phlegmonous inflammation is invariably injurious. It is not easy to account for this remarkable difference. Diffused, spreading cellular inflammation around the rectum appears always to proceed from some local cause, but must be treated irrespectively of it, as if it were a primary disease. The rectum within the sphincter is liable to be pierced by ulceration. Not much is known of the mechanism of this event. It is commonly unsuspected till a result appears, and the commonest one is an internal fistula communicating with the bowel alone. But sometimes this appears to form the source of diffused spreading cellular inflammation of the part; perhaps the immediately exciting cause may be some escape of fæcal matter into the cellular tissue, acting like a violent irritant. Then there is a great and rapid swelling of the perinæum, of the nates immediately adjoining, and of the scrotum, penis, and pubes. The lax cellular texture is distended and tense with serous effusion. The skin is tight, red, and shining. In twenty-four hours partial sloughing of the integuments commences in the scrotum and penis. There is also considerable constitutional disturbance. The tongue furred, the pulse frequent, loss of appetite, vomiting, perhaps shivering, followed by symptomatic inflammatory fever. The state of things is like that which ensues upon rupture of the urethra. That this has taken place is the first impression on seeing the parts; but we learn that the patient has had no stricture previously, and even now makes water without difficulty. Of course the complication may present itself of moderately severe stricture of the urethra, not enough to produce rupture or ulceration behind it, with diffused cellular inflammation occurring altogether from another cause. To the possibility of all such combinations in serious cases the surgeon must always keep his attention awake. However, for the first and immediate treatment of the case, there is no necessity for making up one's mind as to its exact cause. There is but one practice to follow, whencesoever the affection may have originated, to prevent troublesome destruction of the integuments by sloughing. In the perinæum, in the swollen scrotum, in the distended cellular tissue of the penis, incisions must be made that will give free issue to the distending fluid, and relief to the tense and inflamed vessels. The incision in the perinæum will inform the surgeon pretty certainly of the source of the acrid injection of the cellular tissue. Either a urinous or fæcal smell of the fluid that comes out, will show what has been the source of the irritation.

Phlegmonous inflammation about the anus and rectum is again either superficial or deep seated, and in either case may present varieties of an acute or subacute character.

Acute deep-seated phlegmon of the perinæum menaces indifferently the urethra or the rectum, or may implicate both. If it arise from positive irritation in the urethra, it is most likely to open a passage by ulceration into that canal; if the urethra be sound, the rectum stands in greatest danger of this subsequent lesion.

The attack is marked by indisposition, thirst, feverishness, irritability, uneasiness in the perinæum, which is sore when pressed; little external swelling, no inflammation of the integuments. There is more tenderness on pressure than belongs to inflammation of the prostate gland; but the vesical irritation, and the peculiar sensations in and after making water, which attend inflamed prostate are not complained of. Yet the patient is daily more uneasy: there may be wandering at night, restlessness, with very frequent pulse, and very considerable constitutional disturbance. Quiet, the recumbent posture, fomentations, liquid diet are resorted to; and the application of leeches may temporarily alleviate the deep-seated wearing uneasiness. A lancet plunged prematurely into the nidus of phlegmon, only makes matters worse; but the instant suppuration has begun, this step cannot too soon be taken; if half a teaspoonful of matter only escapes, the patient is conscious of extreme relief. What has given rise to its painful character has been the compression of the deep-seated phlegmon by the perinæal fascia; yet, as was said before, it would not have done to have pierced this before suppuration had commenced, but as soon as that process is in action, there is something, which in the order of nature requires a vent; and then the integuments do not resent being thrust through by the lancet.

The difficulty is to know the right time for this operation, which, rightly done, entirely relieves the patient, who is progressively better every half-hour afterwards. There are some general signs:—if a rigor has taken place, if the character of the pain has altered, and become occasionally lancinating, every now and then a single throb shooting through the part, instead of the uninterrupted dull aching; and finally, if the surgeon, by tight pressure and counter-pressure with two fingers, can detect, though obscurely, a sort of deep-seated elasticity, then he is to risk plunging a bistoury, or a lancet up to the shoulder, towards the supposed suppuration. The examination through the rectum by the finger will help to decide as to the nature and condition of the case, and the depth and direction for the introduction of the lancet. A small piece of lint dipped in oil should be left in the opening of the skin, and poultices continued to encourage the reduction of the inflammation, which in favourable cases speedily disappears, but the patient is to be kept perfectly quiet and cool in body, to secure his primary recovery, and to prevent after consequences.

Deep-seated, indolent phlegmon about the rectum is generally not identified till extensive suppuration has taken place, and the rectum lies in a bag of pus. Not but there have been general symptoms, but these have not yet been traced to the local cause, which has been attended with quite incommensurate local symptoms. The patient is feverish or ill with headache, perhaps delirium, or his general indisposition may be slight, in time something unusual is mentioned as felt about the perinæum, and the surgeon called in discovers sensible fluctuation around the whole circumference of the sphincter. The case is clear. The abscess must be opened by a puncture with a tolerably broad lancet on both sides of the sphincter, a vast quantity of offensive matter finds vent, and the patient is better directly.

The point is to get the abscess to close rapidly. This is done by letting the matter have free vent, which is to be obtained by the place and direction of the two or three lancet incisions, not by any great incision. A free incision in such a case will take weeks to heal in the flabby state of the parts. Rest is to be observed, but the patient wants sustenance and nourishment.

LECTURE XI.

HÆMORRHOIDAL TUMOURS.

MY first treatise on hæmorrhoidal tumours was published in 1848. The plan of treatment then advocated has stood the test of time and a wider and more matured experience, and its intrinsic value has been appreciated by a large class of the profession, both here and on the continent.

The idea of treating piles with nitric acid originated with Dr. Houston, and from the success obtained by him in the treatment of the vascular tumours of the rectum, I was induced to try this remedy in other kinds of piles. I have also to acknowledge much valuable information derived from the lectures delivered by Sir B. Brodie, and from the late Herbert Mayo, with whom I had the advantage of an intercourse of several years' duration.

It was in 1843 that Dr. Houston published an article in the *Dublin Journal of Medical Science*, advocating the use of strong nitric acid in two kinds of hæmorrhoidal affections. The first of these, is described as a sort of aneurism by anastomosis of the small vessels of the mucous membrane and submucous cellular tissue; the second, as of a chronic inflammatory nature, which might be best illustrated by comparing it to the red, villous, tender, hæmorrhagic surface exhibited by the mucous membrane of the eyelids in old cases of chronic conjunctivitis. The direct application of the nitric acid to these vascular tumours, Dr. Houston was led to believe, combined in itself all the advantages possessed by excision or ligature, without any of their disadvantages. Besides the two classes of affections abovementioned, Dr. Houston mentions that he had reason to believe that the use of the strong nitric acid might be beneficially employed for the removal of dilations of the larger veins of the bowel, sometimes connected with these vascular tumours.

Acting upon the hint thus afforded, I was induced to try the effect of the local application of the strong nitric acid to other kinds of hæmorrhoidal tumours; and in 1848 published some cases and observations, showing the applicability of this mode of treatment to various kinds of hæmorrhoidal affections, and especially to such as were connected with a relaxed condition of the mucous membrane of the rectum.

The benefit derived from this plan of treatment must not be expected to ensue until the small ulcers made by the caustic begin to heal. The loose folds of mucous membrane are then drawn upon, and the whole of the mucous lining is rendered more tense. Each small cicatrix, moreover, serves as a permanent point of attachment for the relaxed membrane, and consequently the inner coat—which alone descends in such cases—is retained permanently in contact with the other coverings of the bowel.

The degree of pain experienced in this operation depends in a great measure upon the way in which the nitric acid is applied. The sensibility of the thin skin around the anus is very great; and if the acid be allowed to come in contact with it, the degree of pain is very considerable. If care be taken, on the other hand, to confine the application of the acid to the comparatively insensible mucous membrane, extremely little pain is caused. Nitric acid should never, therefore, be employed in cases of external hæmorrhoids, both because of its painful action on the skin, and because it is not the remedy required, that being excision by the knife or scissors.

When a considerable amount of the mucous membrane descends with the tumours, it is desirable to select certain portions, to which the application of the acid should be confined. The best mode of effecting this object is to apply it through a small speculum with an aperture in its side. Through this aperture the mucous membrane or pile will protrude, and may be effectually destroyed. As soon as this is accomplished, the surface should be smeared with a paste made of chalk and water, and the speculum withdrawn. Every portion of mucous membrane to which the acid extends should be as completely as possible deprived of vitality. So little inconvenience does this give, that the patient is generally not aware that the acid has been applied.

Unless these conditions are observed, the application of nitric acid, or of any other caustic, to the mucous membrane of the rectum, may prove as serious an operation as that for which it is intended as a substitute.

The acid should be the strongest that can be procured. That which is usually kept by chemists under the name of the strong nitric acid does not effectually destroy the surface to which it is applied; and when used, it therefore produces more pain than the strongest acid, and cannot moreover be so certainly relied upon to accomplish the intended purpose.

A not uncommon and convenient way of applying nitric acid, when the tumours can be protruded, is to encircle their base with an instrument which will at the same time hold them in their situation, and make sufficient pressure to prevent hæmorrhage in case they should be disposed to bleed. If the parts cannot be protruded, the same object may be gained by a speculum inserted within the bowel. If necessary, any portions of the hæmorrhoidal tumours, or of the mucous membrane, may be removed with a pair of curved scissors, and the cut surfaces immediately wiped dry, and touched with the acid. If the application of the acid be made before any bleeding has taken place, the blood in the divided vessels will become coagulated, and the vessels permanently sealed.

Care must be taken in performing this operation, when any portions of mucous membrane have to be excised, that the pressure completely commands the hæmorrhage; for if any blood escape from the part it will become mixed with the acid, and thus prevent it from effectually acting upon the surface to which it is applied. The instrument which I devised in 1848 for restraining the hæmorrhage under these circumstances, and for holding the prolapsed tumour in position, consists of two parallel curved plates of steel, with their internal edge slightly indented. These are connected together at their extremities, and by means of a screw or spring may be made to exert the exact degree of pressure required.*

There is a large class of cases which generally pass under the common name of piles, that have not an inflammatory origin, and are not connected with any particular enlargement of the hæmorrhoidal veins. In the instances alluded to, the inconvenience arises from portions of the relaxed mucous membrane becoming inverted and gripped by the muscular fibres situated at the lower part of the rectum.

The insensibility of the mucous membrane in this complaint frequently causes the symptoms to be referred to the neighbouring parts, and therefore the disease may exist without being recognized. A patient will complain of a dull pain over the sacrum, or a heavy aching pain in the perinæum, which neither he nor his surgeon can satisfactorily account for. In the course of time, some other symptom presents itself, which draws attention to the rectum. The usual internal remedies for piles may now be administered, but these are found to produce no ultimate benefit, since the disease depends upon a mechanical cause.

A gentleman had for a long time experienced pain on the outside of his heel, and for this he had tried in vain different kinds of remedies. He suffered also from piles, which were effectually cured by the application of the strong nitric acid. The pain in the foot now entirely subsided, and did not return. This gentleman was a medical man, and had no doubt that the pain in the heel had all along depended on the piles.

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* The instrument described by M. Jobert, in the "Gazette des Hôpitaux," of the 1st October, 1853, is a modification of the above, a description of which was published in 1848.

A lady had for a period of three years suffered from most distressing pain around the lower part of the back and down the outside of left thigh. The pain would come on often at night, and last for hours. She was never sure that she would have a day's ease. She had suffered from piles, and upon making an examination in November, 1865, I found in addition an internal fissure. The local disease was cured, and the pain which had tormented her so long was entirely relieved.

In cases where the mucous membrane of the rectum has acquired an habitual disposition to "bag," it frequently happens that no medicine applied either generally or locally will afford relief. The loose folds of membrane, which may or may not be connected with hæmorrhoidal tumours, will descend again and again, and sometimes keep up irritation in the part for years.

Permanent relief in such cases can only be afforded by such means as tend permanently to brace the mucous membrane of the bowel. The simplest, as well as the most efficacious method of accomplishing this, is to remove one or two longitudinal folds of mucous membrane in the same way as above recommended for the removal of hæmorrhoidal tumours. It is not necessary to remove the precise portion of membrane which has been protruded. The destruction of any portion, after the wound has healed, will have the effect of bracing the remainder. In this, as in the operation for hæmorrhoidal tumours, it is the process of cicatrisation which cures the disease.

These observations, which I published in 1848, have been fully confirmed by increased experience.

The use of local caustics in hæmorrhoidal affections, great as it is, was unfortunately much exaggerated, so that the application of strong nitric acid became very general, and a useful remedy was brought into discredit by its indiscriminate application. The result of this indiscriminate use has been that its merits at present seem to be under-estimated. It is essential, therefore, that we possess a clear knowledge of the class of cases in which this agent is alone required, as well as of those in which it will not prove effectual.

A distinction may be drawn between the different kinds of hæmorrhoidal tumours founded in their different anatomical characters. Thus, there is the red, highly vascular, spongy tumour, composed of small arteries and arterial capillaries: the larger, bluish swelling, being mainly composed of dilated veins. Sometimes these two forms are combined in the same swelling, which is at one part chiefly arterial, at another venous. Indeed, as the structural characteristics are themselves continually undergoing changes, such a distinction is often of comparatively little practical value. We may roughly contrast the leading features of these two varieties. The first is most frequent in young persons. It is more sensitive and more disposed to bleed. The second is more common in middle-aged persons. It is liable to spontaneous coagulation of the blood within the vessels, or rupture of their coats, effusion of blood into the cellular tissue and below the mucous membrane ; to attacks of inflammation, which may be acute, or to a chronic inflammatory action and the effusion of lymph, which induce hypertrophy and condensation of all the structures.

The nitric acid, as Dr. Houston's remarks indicated, is pre-eminently adapted for destroying the bright fungous-looking growth, which is readily extruded, and so often seen in young people.

The cases which are met with in practice are perhaps more simply and conveniently divided, for the purpose of treatment, into those which bleed, or are composed of a soft vascular substance ; and those which do not bleed, or are formed of firmer tissue.

1. For the first of the two classes of cases, the application of the nitric acid is an excellent remedy, and in many instances no other means of surgical treatment are required. The acid penetrates the substance of the tumour, and produces its effects, either by causing a superficial slough, or by obliterating the vessels of the part. It possesses the great advantage of giving little or no pain if properly applied, of not requiring the confinement of the patient, and of being perfectly safe.

The following cases, from my note-book, afford illustrations of this mode of treatment.

Case I.—T. F., aged 42, residing in Belgrave Terrace, came under treatment on the 25th of July, 1847. He stated that he had been affected with piles ten years. Ever since their first appearance he had been subject to repeated attacks of hæmorrhage. Two years before I saw him he had had the piles tied. This afforded him temporary benefit, and he remained tolerably well for six or eight months. He had also tried, both before and after the operation, various sorts of remedies, consisting chiefly of ointments and lotions, but none of these gave him permanent relief.

In July, 1847, he was suffering so much pain that he was unable to sleep at night, and he experienced such a degree of irritation as to unfit him for any exertion.

Upon examination, a cluster of internal piles could be detected, and might be seen protruding through the external orifice. As he continued to lose much blood, and a considerable portion of mucous membrane occasionally protruded, the strong nitric acid was applied on August 2nd to one of the most vascular and protruding tumours ; and as this produced no inconvenience, a more free application of the acid was made a few days afterwards, so as to destroy a considerable portion of the protruded mucous membrane. After the operation, upon each occasion, the parts were replaced in their natural position. The continued loss of blood had at this time produced a visible alteration in this patient's health : he had become very pale, and languid, of a sallow hue, and constantly complained of depression and weakness. He was now directed to go into the country, and he was ordered some quinine and sulphuric acid. Not to enter into tedious details, I may add that on April 1st, 1850, he had continued free from hæmorrhage, and remained well, with the exception of a slight occasional bearing-down pain. He said that he now felt quite another man, and could attend without interruption to his business, which formerly he could never do for long together. In the summer of the year 1854, he had some slight return of hæmorrhage, but not sufficient to require any further surgical treatment.

Case II.—S. D., æt. 31, came under my notice in November, 1850; about four months previously, she first experienced irritation and pain in the situation of the rectum after walking or riding. This was accompanied by a very uncomfortable sensation of bearing down. About a month after the first appearance of these symptoms she first had hæmorrhage from the bowel. The blood passed was fluid, and came only with the motions. The quantities discharged gradually increased, and soon appeared whenever she passed her motions or water. She would occasionally, at these times, lose as much as a quarter of a pint at a time. From this cause she had become extremely weak and exsanguine.

On introducing the speculum into the rectum, a tumour presented itself on the right side. Immediately above this was a transverse ulcerated fissure, from which the blood was seen to spurt across the speculum in a single continued stream. This fissure was so situated that any descent of the hæmorrhoidal tumour would necessarily draw upon and separate its edges. The tumour and the fissure above it were touched with the strong nitric acid on the 14th of November.

November 22nd.—She had had slight hæmorrhage the second day after the operation, but since that day she had not perceived any. She was now feeling stronger, and had improved in her general appearance.

December 17th.—She had had no hæmorrhage since the last report, and had regained her usual health. The bowels were now quite regular, and the motions passed without pain or inconvenience.

This and the following case seem to afford satisfactory evidence that in severe hæmorrhoidal affections the bleeding may occasionally come from a single vessel, although, doubtless, in the great majority of instances the blood is poured out from the general surface of the tumour. In either case the disease is effectually remedied by the application of the strong nitric acid.

Case III.—H. S., æt. 42, presented himself as an out-patient at King's College Hospital, on August 26th, 1852. He then stated that he had been troubled with hæmorrhoidal tumours for twelve months, and that for eight or ten months he had lost a large quantity of blood. In consequence of this continued hæmorrhage, he had become completely blanched and very much out of health. Upon examination with the speculum, a vessel was seen pouring out blood *per saltum.* The strong nitric acid was applied to the part whence the bleeding proceeded, but the continued flow of blood swept the acid away as fast as it was applied, so that the operation could not be satisfactorily performed.

August 30th.—He experienced a good deal of uneasiness after the application of the acid. This probably depended upon some of the acid having become mixed with the blood, and having in consequence become diffused over the mucous surface.

The bleeding had not stopped, but the blood passed was greatly diminished in quantity. The lower part of the bowel still felt sore, and it was therefore determined not at that time to repeat the application of the nitric acid.

This was, however, done upon the 9th of September.

13th. The bleeding had now ceased.

Oct. 1st. He had had no bleeding since the last report. There was now no tendency to prolapsus, or any other local inconvenience.

1853. April 18th. He remained quite well.

This patient has completely regained his health and strength, and he has not, so far as I know, suffered any return of his local inconvenience up to the present time.

During the last eighteen years I have applied the strong nitric acid to a variety of hæmorrhoidal tumours; and, as a very general rule, I have found that it has completely and permanently prevented the recurrence of hæmorrhage; and that, where this symptom has been the only, or the principal one, which caused distress to the patient, no other remedy has been requisite to cure the disease. Where other inconveniences besides hæmorrhage have been present, and the mucous membrane has not become changed in character, and hardened (as is sometimes the case, either from constant exposure, or from repeated attacks of inflammation), the application of the strong nitric acid has been alone sufficient to remove the complaint.

When it is applied to a portion of mucous membrane which has undergone no material change in structure, it permeates the tissues to a certain depth, in the same way as other fluids do when applied to an internal surface of the body, and partly by its direct action on the living tissue, and partly by coagulating the blood in the veins, it completely destroys the vitality of the part. The action is under ordinary circumstances confined to the mucous membrane and the vessels which supply it. The acid does not penetrate deeper than this; and, consequently, its effects being thus limited in depth, may be regulated with great nicety, according to the extent of surface to which it is applied.

This operation, properly performed, appears to be perfectly safe; for although cases have been recorded in which very unpleasant symptoms have arisen after the application of the nitric acid, yet, never having witnessed any such, except where the acid had been injudiciously employed, I am led to conclude that such symptoms may be attributed to the rules concerning the use of this remedy, already laid down, not having been observed.

II. The cases in which the use of the nitric acid alone has not proved successful, are those in which a large extent of mucous membrane has been involved, or where it has become thickened, and the subjacent parts infiltrated with lymph, as the result of repeated attacks of inflammation; and those in which the mucous membrane from long exposure has become hardened and altered in structure. The first of these orders of cases is often met with in the comparatively young and plethoric; the second, in patients of a languid temperament, or advanced in life. The acid, when applied in such instances, does not sufficiently permeate the structure of the mucous membrane; it usually removes a superficial layer only, which is soon replaced, and the diseased parts are left in much the same condition as before. These observations are illustrated by the following cases:—

Case IV.—A lady, of full plethoric habit, and of a florid complexion, who had had several children, wished something to be done for some piles, which had caused her some inconvenience for a considerable time. The tumours were found to consist of firm, solid, oval masses, of a bright red colour, covered by the smooth mucous membrane near the margin of the anus. The tumours were touched with the strongest nitric acid in the usual way. At the expiration of a fortnight, they were found to be in very much the same condition as before the acid had been applied.

Case V.—A clergyman, between 70 and 80 years of age, but in good general health, complained of the constant inconvenience attending a partial prolapsus of the mucous membrane of the bowel, and a constant discharge of a brownish fluid, which discoloured his linen. This affection had lasted for several years. Upon examination, the mucous membrane was found slightly livid, perfectly smooth upon the surface, and possessing very little sensibility. It was touched in the usual way with the strongest acid. The operation gave no particular pain. A week after, this patient again applied, and it was evident upon examination that the parts were in much the same condition as before the operation. The acid was again applied as before, and the patient allowed to return home into the country. A few weeks after, I heard from this gentleman that his inconvenience had not been relieved, and it became a question what more effectual remedy could be had recourse to.

CASE VI.—A medical man, advanced in life, consulted me on the 27th October, 1851, in consequence of the inconvenience he had long experienced from a protrusion of the mucous membrane of the bowel, accompanied by a constant discharge. The complaint had existed for many years. Upon examination, a smooth pouch of mucous membrane was found projecting on each side. The membrane was quite smooth, little vascular, and possessed little sensibility. It was touched with the strong nitric acid in the usual manner. This gentleman, who came from Wales, called on me some months afterwards. He then stated that, although relieved he was not cured, and he thought that "something more might be done." The caustic was applied a second time, but still, as was subsequently learnt, with but partial success.

In such instances, the mucous membrane, by repeated attacks of inflammation, as in the fourth case, or by long exposure, as in the fifth and sixth cases, becomes altered in structure. It has no longer its villous character, and presents a perfectly smooth surface. It gradually loses its natural sensibility, becomes possessed of comparatively little vascularity, and occasionally is found covered with cuticle. The application of nitric acid under these circumstances does no good; for the reasons above mentioned, it does not act sufficiently upon the parts to produce a cicatrix. Its use is consequently apt to lead to disappointment.

Whenever there is reason to believe that the application of nitric acid alone will not act sufficiently upon the mucous membrane, the plan which I have for some time adopted is as follows:—The affected parts are first made to protrude, and then embraced by a broad forceps, made upon the plan of the instrument described by me in 1848.

With this instrument the prolapsed part is seized, and such a portion of it as may be deemed expedient is cut off on the side of the "clamp" next to the operator with a curved knife made for the purpose. The cut surface is then touched with the strong nitric acid, or with the actual cautery. The parts are returned into their natural position, and the operation is completed. This plan is equally adapted for the removal of hæmorrhoidal tumours, and for the excision of portions of relaxed mucous membrane where no hæmorrhoidal tumours apparently exist. The forceps retain their hold of the base of the prolapsed part after the requisite portion is removed. The cut surface is thus prevented from either bleeding or retracting, and it is held in a convenient position for the application of the cautery or caustic. This application is as essential a part of the operation as securing any bleeding vessels is after an operation in any other part of the body.*

When the parts cannot be sufficiently protruded to be conveniently seized by the forceps, the operation can be very satisfactorily performed in the following way:—A rectum speculum has a slide upon one side which may be removed; this is made to fit accurately into grooves on each side, so that by being withdrawn to a greater or less extent, a corresponding aperture is left in the side of the instrument. When the speculum is introduced, the slide is partially withdrawn, and the instrument moved about until the tumour, or the portion of mucous membrane required to be removed, projects into it. The slide is then closed, and the tumour is firmly held between it and the rest of the instrument; the projecting portion may then be cut off within the speculum by a long narrow knife, and the cut surface touched as before with the actual cautery, or with the nitric acid. Or in case it should be deemed advisable to remove a longitudinal portion of the mucous membrane, the operation may be varied as follows:—The speculum, instead of being made single, is made double; that is, there is one speculum within another, so arranged that the outer one will revolve upon the inner. Each part has an oval aperture at its side; when these apertures correspond a tumour or portion of relaxed mucous membrane, will readily project into the speculum. When the part to be removed has thus passed through the corresponding apertures, the different portions of the instrument are made to revolve upon each other, and thus the aperture is diminished, until the condemned part is embraced between its opposite sides. Being thus firmly held, the operation is completed as above described.

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* The following is the description of this instrument published in the "London Medical Gazette" for 1848:—"The instrument which is best adapted for restraining the hæmorrhage under these circumstances consists of two parallel curved plates of steel, with their internal edges slightly indented, so as to fit each other when they are brought together; these two plates are connected at each end by a small cross bar, to which a screw is adapted so as to produce the exact degree of pressure required."

All the instruments above mentioned, are made by Mr. Matthews, of Portugal Street; and although they are very simple now that they are finished, yet a considerable amount of time and patience have been required in order to get them adapted to their intended purpose.

Case VII.—R. H., æt. 39, of sedentary habits and swarthy complexion, applied to me in the summer of 1852. He stated that he had suffered from piles for ten years. During the whole of that time, he had passed blood when he went to the water-closet, and for the last four months he had suffered much pain after each evacuation. A considerable portion of the mucous membrane projected whenever he strained, and this was always followed by an uneasy sensation, which lasted for some hours. As the bleeding in this case, although considerable, did not form the principal feature of his complaint, and as it was probable that, even if this were arrested, the protrusion of the mucous membrane and consequent inconvenience would continue, it was resolved to remove a portion of the prolapsed membrane. For this purpose, the patient was placed under the influence of the monochloruretted chloride of ethyle, by Dr. Snow, on the 24th of June. A portion of the protruding mucous membrane was removed in the manner above described, and the cut surface was touched with strong nitric acid.

July 7th. For the last four days, the pain had entirely ceased. He said that he now felt "quite a new man." He had no inconvenience or protrusion after a motion.

July 21st. He felt quite well; there was no return of pain or bleeding, or other inconvenience. He had not experienced any return of his complaint in 1853, when I heard from him.

Case VIII.—E. S., æt. 50, a widow, had been subject to piles, accompanied by occasional slight discharge, for twenty years. During this time, she had been habitually somewhat costive, but her general health had been good, with the exception of a feeling of weakness, caused by repeated loss of blood during the last two or three years. This patient had come under my care in the summer of 1852. The hæmorrhoidal tumours were then touched with the nitric acid; but no details of the case were then preserved. She applied again on the 5th of December, 1853. Temporary relief had been derived from the previous treatment, but her symptoms had subsequently returned.

Upon examination, a thick fold of hypertrophied mucous membrane, covered with cuticle from long exposure, surrounded the margin of the anus. Altogether, this formed a mass the size of a pigeon's egg.

Upon separating its different portions, the membrane internally was seen to be quite smooth, little vascular, and covered by a thickish muco-purulent secretion. A portion of the hypertrophied mucous membrane on each side was seized with a clamp, and removed with a sharp knife, bent laterally. The cut surfaces were then touched with the actual cautery. No narcotic was used in this instance.

Dec. 7th. She was suffering no pain, and appeared quite comfortable. There was no fever. Her circumstances required her to walk a short distance from her home, which she did without inconvenience.

Dec. 12th. There was a little local pain, accompanied by slight discharge, and some bearing down after a motion. No fever.

Dec. 28th. She had a little smarting, but had suffered no other pain since the last report.

The wounds were now all but healed, and the portions of hypertrophied mucous membrane not removed were daily diminishing in size.

Feb. 1st. She had felt no inconvenience since the last report. There were some small remains of the flaps of hypertrophied mucous membrane, which had been left on each side of the anus, but these had assumed a healthy appearance. The discharge had ceased, and she felt herself quite well. In this instance, the period of recovery was unusually long, owing probably to the great thickening and alteration which had taken place in the structure of the protruded membrane.

Case IX.—J. W. came under my care at King's College, on the 30th January, 1854. Six years previously he found that he habitually lost a considerable quantity of blood when at stool, and for three or four years he had suffered from occasional prolapsus of the bowel. After this he went to America, and returned in very good general health. The bleeding had now entirely subsided, but the inconvenience attending the prolapsus still continued.

Upon examination, an oval, red, solid tumour, irregular upon its surface, and about the size of a large strawberry, was seen projecting from between some thickened and hypertrophied folds of mucous membrane. The parts presented little sensibility to the touch, and were not disposed to bleed. Whenever the tumour descended, it caused a dull heavy pain, occasionally, as he expressed it, of a "dragging" character.

On the 1st of February, the oval tumour was seized with a clamp, and removed. The cut surface was immediately touched with the actual cautery. Portions of the hypertrophied mucous membrane on each side were treated in the same way. Upon removing the clamp, the hæmorrhage had entirely ceased. *The patient being deaf, and having his face averted during the operation, was not aware that the actual cautery had been applied.* He walked home, and was desired to keep still during the remainder of the day.

Feb. 3rd. He said he was a great deal better. He experienced slight shooting pain now and then in the part, and felt a little sore when he walked. There was no fever; he felt quite well in himself; and his appetite was good. Some folds of the thickened mucous membrane around the anus, which were not removed, had assumed a healthy appearance.

Feb. 6th. He came regularly to the hospital as an out-patient, without inconvenience.

Feb. 8th. There was now no discharge from the bowel, and no prolapse upon going to the water-closet. The folds of thickened mucous membrane which were left had become generally reduced in size, and the whole surface was assuming its natural healthy appearance. The wounds left, in consequence of the removal of the lower folds of thickened mucous membrane, were much smaller, but not yet healed.

Feb. 10th. In his own words, the patient felt "very well indeed;" he "walked more than twenty miles" on the previous day, to "Hounslow and back." There was no pain, but slight itching. Upon examination, the little wounds were not quite healed, but looking quite healthy.

This mode of operating, I have now put in practice a considerable number of times in the treatment of hæmorrhoidal and other kinds of tumours. It possesses the great advantage of allowing the surgeon at once to remove any part that he may wish, of enabling him at the same time completely to control the hæmorrhage, and prevent the occurrence of it after the operation. The difficulty of accomplishing this, as is well known, has prevented surgeons from employing excision of late years for the cure of hæmorrhoids. M. Dupuytren, who advocated excision in these cases, on account of the pain and inconvenience attending the usual mode of operation, nevertheless confesses that hæmorrhage to a serious extent occurred in two-fifths of the cases upon which he operated, and in which no means had been taken to prevent subsequent bleeding. By the means now recommended, the great and only objection to the excision of hæmorrhoidal tumours is removed. I have occasionally found that some hæmorrhage has continued after the cut surface had been touched with the nitric acid; but in no case has there been the least inconvenience from this source where the actual cautery had been employed.

The pain of the actual cautery is in a great measure prevented by the natural insensibility of the mucous membrane to pain, and the numbness produced in the part which is held by the clamp. Chloroform may be used if the patient be nervous, or the pain may be very much relieved by freezing the tumours, or the portions of mucous membrane, before they are removed. This may conveniently be done by applying to them for a minute or two a ball of iron, which has previously been left in a mixture of pounded ice and salt.* It is only, however, when operations involve the skin, such as the excision of external piles or redundant growths of the external integument, that there need be any apprehensions about the pain.

I consider the advantages of this operation, as compared with others employed for the cure of hæmorrhoidal tumours, to be:—

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* This is a modification of the plan proposed by Dr. James Arnott.

1. That it is less painful than any other means equally efficacious.

2. That it is safer than the common operation now in general use.

3. *That it requires less confinement, and the patient is sooner convalescent, than after an operation with the ligature in the ordinary way.*

Each of these points requires a brief consideration.

1. The pain caused by the application of the ligature to a hæmorrhoidal tumour may be divided into that which is felt during the operation, and that which is subsequently experienced. That produced during the operation is caused in a great measure by the forcible dragging upon the part during the time the ligature is being tightened. It is very difficult during the operation for the surgeon to get his hand on the same plane as the protruded bowel. The necessary consequence is, that the ligatured portion of mucous membrane is drawn out to a level with the hands. The inconvenience produced by this "dragging" upon the intestine is altogether obviated by the operation now under consideration. The hæmorrhoid may be removed, if necessary, without even being protruded through the external opening. The pain and irritation caused by leaving the ligature upon the part to be removed are also avoided.

2. Although the ordinary operation for hæmorrhoidal tumours is reckoned safe, yet instances every now and then occur in which very severe and even fatal effects follow. Sir B. Brodie mentions having,

in his own very large experience, had three fatal cases. I had the opportunity of dissecting the parts after a fatal result in three other instances, where the operation had been performed by the most able and cautious surgeons of the day. In two of these instances, secondary deposits had occurred in internal organs, and in the third there were symptoms of blood poisoning during life, and an open vein of some size was found after death, leading directly from the wound caused by the operation. When the base of a hæmorrhoidal tumour is transfixed with a needle, any large vein which it may happen to contain is necessarily liable to be wounded; and if, after this is done, each half of the tumour is included in a separate ligature, it is extremely likely that the sides of such a vessel would be held open. This circumstance, in the subsequent stages of the complaint, would, as far as it goes, directly favour the absorption into the circulation of the inflammatory products of the part. If, on the other hand, the whole of a hæmorrhoidal tumour is included in a ligature, there is a possibility that it may not be completely strangulated. The outer parts of the tumour may slough, while a languid and partial circulation is continued in a conical portion in its centre. The blood which there circulates through the tissues on the verge of mortification, but which have not entirely lost their vitality, may become infected by the products of decomposition with which it comes in contact, and may thus, being again received into the circulation, become the source of general disorder in the system. This point is well illustrated by cases in which a ligature has been applied to portions of the tongue. It has been found that, as ulceration occurred in those parts directly subjected to pressure, the ligature has gradually become loosened. The circulation has then again in some measure been restored in the centre of the ligatured part, and this has been followed by symptoms of general constitutional disturbance.

After the application of a ligature to a large tumour in any part of the body, such a partial restoration of circulation may take place. There is no distinct and immediate line of demarcation drawn between the living parts and the dead; and it may be left to accidental causes to determine how much of the tumour may recover its vitality, and how much of it will perish.

That a general contamination of the blood, from some cause or other, occurred in the three cases which I had an opportunity of examining, there cannot be a doubt; and I believe that this source of danger would be entirely prevented by performing the operation in the manner which has now been described. The application of the actual cautery, while it prevents any blood flowing from the divided vessels, also prevents any vitiated fluids passing through them into the general circulation.

3. After the application of a ligature to a portion of mucous membrane, a process of ulceration is induced, and continues until the ligature separates. During this period no process of repair can be commenced. At the time the ligature falls off, the surgeon will often be surprised, if he happens

to see the part, at the size of the wound which is left. By the process of ulceration it is rendered much larger than it would have been by the simple removal of the hæmorrhoidal tumour.

After excision of the tumour, and the application of the actual cautery, no cause of irritation remains. The operation is complete, and the process of repair at once commences. The wounds, when seen on the following days, always appear smaller than the portions of mucous membrane which have been removed. The object of the application of the cautery, it is to be remembered, is not to destroy any depth of structure, but simply to seal the divided vessels, which, in this operation, afford the only cause for anxiety. The superficial slough, which is made for this purpose, is very soon thrown off; and a clear definite line is at once drawn between the parts destroyed or removed, and those which it is intended to leave; and there is nothing to prevent the process of cicatrisation from commencing immediately. Within a week almost every patient will be able to take exercise and resume his occupations.

It is not necessary in the operation now described to include all the diseased or protruded membrane. The removal of some portions exerts a beneficial influence on that which is left. The same observations apply in this respect to the removal of a portion of mucous membrane by excision, as to its destruction by the application of the strong nitric acid. Whether the operation has been the removal of a portion of mucous membrane by excision, or its destruction by nitric acid, the permanent benefit is in either case produced during the process of cicatrisation.

It will be readily seen from the foregoing remarks, that the employment of the ligature holds a much more restricted position in my practice than it does in that of many of the ablest surgical writers. It may be asked, therefore, if I altogether ignore this method of treatment? Certainly not. Cases occasionally occur in practice for which the ligature is by far the most suitable, and therefore the best remedy.

When the swelling of the rectum resembles an erectile tumour, in being composed of varicose veins, dilated and anastomising arteries; when it involves a considerable extent of surface, is broad based, sessile, and particularly if the affection be attended with severe attacks of hæmorrhage, the ligature may be the only method of cure. Again, where the hæmorrhoids have been of long standing and exposed to long-continued irritation, and the coats of the veins become much thickened and altered where they are irregularly dilated and varicose, so that the tumour, on section, shows a cystic structure in its interior, bounded on all sides by an indurated and hypertrophied fibro-cellular growth; or where the gut is very lax, and a considerable amount of prolapsus becomes superadded to the local tumour,—ligature is the proper remedy.

LECTURE XII.

POLYPI OF THE RECTUM, EXCRESCENCES AND FISTULA OF THE ANUS.

IT remains to notice a few affections of the rectum, which are sometimes mistaken for piles.

We occasionally find little bag-like processes of mucous membrane within the rectum, resembling polypi, but still not exactly identical with them. When these little growths remain above the sphincter they may give rise to no symptoms and only be discovered by accident. There are other excrescences from the mucous membrane which possess a structure partaking of the character of uterine polypi. These are generally single, but in rare instances in clusters of three or four.

Polypus of the rectum is occasionally, though rarely, met with in the adult. It is most frequent in children, when it is also much more vascular, and hæmorrhage from the bowel is a prominent symptom.

In all cases where polypus of the rectum is suspected, it is a good plan to examine the patient soon after an action of the bowel. By this means we may discover a growth which, at other times, has receded some distance into the gut.

The polypus of the adult bowel is a fibro-cellular structure possessed of trifling vascularity only. It is generally seated about an inch from the anus, and it may vary in length from half an inch upwards, according to the length of its pedicle.

When these growths descend during the action of the intestine, the sphincter muscle closes firmly upon them, and occasions the patient very acute pain. If the swelling continues to protrude at other times, it becomes irritated and inflamed, and ulceration may take place with a great aggravation in the patient's symptoms. A sense of swelling present in the bowel, a mucous discharge, and probably a little blood, are the symptoms. In these cases immediate relief, without the slightest danger, is caused by their extirpation. If the pedicle of the polypus extends somewhat high up, we may hook it down with the finger, and ligature it before snipping it away.

The polypus of children has a similar structure to the last, and differs from it mainly in point of vascularity. When the child is at stool prolapse of a small tumour of bright red colour takes place, and hæmorrhage ensues, often large in amount. A slight bleeding may also continue long afterwards. These occurrences in a child lead to a suspicion of polypus, and the rectum should be carefully explored. It is generally found within an inch of the anus; but sometimes it has an attachment higher up. The plan of treatment is very simple and successful. Seize the growth, draw it downwards, and by a process of twisting with forceps you may detach it; or a ligature may be tightly applied to its stalk, and the polypus be allowed to remain in the bowel until it sloughs off.

CASE.—Thos. F., æt. 10, was admitted into St. George's Hospital, on the 25th of October, 1865, supposed to be suffering from a prolapsus of the rectum, accompanied by occasional loss of blood. The symptoms had existed for two years, and were so troublesome, that he was about to be dismissed from a school at which he was being educated. On the 4th of November the patient was directed to sit over some warm water, and to protrude the bowel, when a polypus projected, the size and appearance of a large cherry, with a very small pedicle. A ligature was placed on the pedicle, and the polypus removed on its distal size with a pair of scissors. After this the patient experienced no inconvenience.

CASE.—Six years ago a gentleman consulted me for what he believed to be a prolapsus of the bowel. He had suffered from his symptoms for twenty years, and never had a motion without the part becoming protruded. Upon examination the protruded part was found to consist of a very firm polypus, the size and shape of a large chestnut. This patient had come to a determination not to submit to any operation by ligature, and I therefore determined to cut off the tumour, and to apply the actual cautery to the cut surface. The pedicle of the polypus which was a quarter of an inch in diameter, having been secured with a clamp, the polypus itself was removed with a knife made for such operations, and bent upon the flat. The cut surface was seared with the actual cautery; one vessel was still inclined to bleed, and this was tied. The clamp was then taken off and the parts returned within the sphincter.

No inconvenience followed this operation, and a complete cure was effected. The polypus being of unusual size, is preserved as a preparation in the museum of King's College.

External piles, when their cavities have become obliterated, and flaps of skin have been formed, which gradually wear away, are apt to take upon them an excrescential form ; but they are easily and obviously distinguished from malignant growth. Where cleanliness is neglected, they very often take on a diseased action, but are of no ultimately important consequence.

Extirpation by scissors or the knife is the remedy, only taking care that the sphincter muscle be not included in the extirpated tissue by a too liberal use of these instruments.

Fistula Ani.

Fistula ani is one of the most common, and occasionally one of the most troublesome cases in surgery. It seems a simple business ; in practice it is often found one of the most difficult to manage. This arises from its being essentially a complicated phenomenon. In the following way we may get at its elements separately.

Gatherings occasionally form in the groin and the axilla. They are superficial phlegmonous abscesses. They break, or are opened. The redness and swelling diminish, but a thin discharge continues, with some hardness running in one or other direction, from the small wound left. If a probe is introduced, it passes into a straight or bent canal two, three, or four, or even five inches in length. If a gathering occur in the middle of the buttock, the back, or the chest, and it be opened, no such residual sinus under ordinary circumstances is left. What has made the difference? In the latter case, in addition to the absence of the irritation which a diseased gland is perhaps creating, two salutary conditions have been present, which were wanting in the former instances; —one rest, the second a moderate pressure.

In the groin and axilla, the areolar tissue is very lax, and there is motion at each movement of the hip, or shoulder joint. There is little pressure in the axilla at any time, and in the groin none, when the hip joints are not fully straightened. So the residual cavity of the abscess has its sides, in these situations, moved on each other, and no bracing support is maintained upon it.

But there is another evil. Those in whom these sinuses form from the above-described causes, are persons either of a scrofulous habit, or of temporarily impaired or broken down constitution, in whom the work of reparation proceeds weakly. The actions in such frames are at once irritable and indolent. This manifests itself thus:—The sinus in the groin runs some way under the skin; a probe is introduced its whole length; an opening is made at the further end, which is kept open by a shred of lint; pressure is made by bandage in the middle of the sinus, with a free vent at either end. The patient is kept perfectly still. If he have some resources left in his health, with this treatment the sinus probably closes. If he be scrofulous, or attenuated by previous illness, the measure fails, the sinus remains.

What resource has the surgeon? He sends his patient to the sea-side, recommends the likeliest course to strengthen and invigorate him, and if he succeeds in giving him flesh and health, the sinus heals at once. Sometimes, however, the cause is local as well as constitutional. A suppurating, fungating, or tuberculous gland exists in connection with the sinus, and the irritation or discharge from this gland prevents its healing.

Now, what are called fistulæ are such sinuses, residues of abscess near the rectum, where the cellular tissue is lax, and without pressure and support, and it has specially this character in persons of debilitated or attenuated frames, in whom abscess near the rectum is most frequent. Among the different classes of artisans, none are paler, thinner, less healthy-looking than working tailors; they are in confined air, have no exercise, and are often persons of dissipated habits. It is just in this class, and those who resemble them most in sedentary pursuits, that fistula is most rife.

It has formerly puzzled the surgeon that abscesses so formed do not heal like abscesses in other portions of the cellular membrane. At first it was supposed that healing was prevented by the action of the sphincter and levator ani muscles only. A great authority was led by a more mature experience to conclude that this view was incorrect. Such causes would unquestionably obstruct the healing of any abscess, yet they would not fully account for the fact that abscesses near the rectum rarely heal spontaneously, nor can the action of these muscles explain their formation.

When a small abscess forms in the lax tissue about the gut, whether it has originated in some lesion of the mucous membrane or not, there can be no doubt that it commonly, although not invariably, makes an entrance into the intestine at one point.

Here another element comes into play. Let us suppose that the cavity and walls of the abscess in the loose cellular tissue represent an incipient sinus. The acrid humours and gases of the intestine find their way in, unwholesomely stimulating the sinus, leading it to burrow further and extend itself, so that it is often found making its way along the side of the rectum, sometimes further up into the pelvis, beyond its point of communication with the gut. The mechanism is this :—A propulsive force acting upon the intestinal contents has to overcome the ordinary contraction of the sphincter. Part of that force becomes expended upon the lower end of the bowel, which "bags" therefore, above this muscle, and a little gas, mucus, or fæces enters into the sinus, and escapes by the external opening, if the fistula be complete. Moreover, every action in the sphincter and levator ani muscles causes movement of the walls of the sinus, and prevents that condition of "local rest" so essential to the healing process.

The mechanical varieties of the complaint are of less consequence, as objects of study and treatment, than the patient's general health and habit of body. It is to be premised, that in all these cases the view taken by the surgeon must be the view of a physician. He must see that the constitution is right, or he must set it right, before he risks defeat in the employment of local means. If the patient's constitution is irrecoverably gone, disease established in the lungs, the liver or kidneys irreparably damaged, or the like, no notice had better be taken of his fistula. It is an additional grievance, no doubt, to the patient to have the continual feeling of something not right, —the discharge of moisture, and discomfort attending fistula; but it is better that he bear this, applying palliative means alone, than be subjected to the repeated surgical efforts for his cure, which his constitutional state renders entirely abortive.

The patient must be in a certain measure of bodily condition, or it is not worth while to put him to the pain even, of an elaborate surgical examination; for to do that effectually—and else it is worth nothing—a very accurate local examination and exploration are necessary. The disease may be—

1. A superficial sinus running towards the os coccygis, and terminating on either side of it, or, as is most frequently the case, passing upwards parallel to the rectum.

2. The fistula ascending in the coats of the rectum, may perforate the bowel almost immediately above the sphincter, which is generally the case, or one, two, or even three inches higher. And the point of perforation may be the extreme upward point of the fistula, or the latter may extend as a blind sinus, still further.

3. The sinus from one orifice may branch into several. There may be more than one point of communication with the rectum. There may be several external openings. The whole of the perinæum may be hard, knotty, undulating, with openings like a rabbit-warren.

4. The case may be complicated with urinary fistula, polypus of the rectum, or piles.

5. Or by stricture of the bowel.

6. The sinus may have no external opening, but communicate only with the cavity of the intestine.

7. In some rare cases, the fistula may be complicated with some exfoliation of bone.

The purely surgical part of the treatment of fistula ani is reducible to a few rules.

Simple fistula running inwards upon the rectum requires the same operation, whether it be blind, or have an opening already into the gut. In searching for the internal opening the blunder is constantly made of doing this too high.

In the majority of cases, this opening is just beyond the internal sphincter—from three to six lines above the anus. After a division of the sinus from this opening downwards, that part of the fistula beyond it will generally heal of itself.

A strong, slightly curved, probe-pointed bistoury, cutting however from the blunt end, is to be introduced along the fistula, the exploring probe being previously withdrawn; at the same time the forefinger of the left hand is passed into the rectum, and receives the end of the bistoury, which has been either introduced through a pre-existing communication or has cut through the intestine at the blind end of the fistula. It is not a bad thing to have a thin silver ring thimble, without a top, as a shield for the fore-finger. If the fistula extends not more than an inch, a silver director or the exploring probe may be passed up it, through the internal opening and bent by the finger in the rectum downwards, so as to project through the anus and then cut out, or the end of the bistoury itself may be brought out at the anus, and then by a strong traction of the instrument the intervening parts divided.

A fine layer of the thinnest lint, dipped in oil, is then to be laid by the probe within the wound, and the patient is to keep his room some days. It is for the patient's comfort that the bowels should be in a slightly relaxed state, and relieved daily. For the first two or three days the bit of lint should be replaced, so as to prevent the lips of the wound closing; but it is not to be driven forcibly and roughly home to the bottom of the wound. The parts are to be kept clean by occasional washing with tepid water, and should be disturbed as little as possible, and the patient's whole system should be kept cool and quiet. Such are the indications favourable to a wholesome restorative process, and union of the wound from the bottom by granulation. If the healing process proceeds tardily, an occasional and slight touch of nitrate of silver will expedite matters. It is surprising how easy it is by inattention to these seeming trifles, for a surgeon to decimate his success and ensure a large percentage of unfavourable results among his patients, even in a case so simple.

In the preceding operation it is all important, if there be a natural opening to the fistula, to include it in the section. If the fistula extend higher, it is rarely necessary to divide this second part to effect a cure.

The above operation is very generally attended with complete success, if the fistula be not more than an inch to an inch and a half or two inches in length. But when it arrives at or exceeds this depth, it will not invariably heal by this limited operation. Division of the gut beyond that extent then becomes an expedient of questionable propriety. The deep wound does not do as well as the incision in the slighter operation. It is difficult to make it heal from the bottom ; the intestine is liable to unite first in the middle, and defeat the whole intention. The fistula may remain, and the operation may be attended with very troublesome hæmorrhage.

It is always possible, even in ordinary cases, to encounter such hæmorrhage, when it has happened that instead of many small twigs, a larger arterial branch has come down near the anus. It should be a rule, on brisk arterial hæmorrhage ensuing in such an operation, at once to secure the vessel with a ligature.

This is easily done when the wound is just made ; as the vessel is first bleeding, it is then easily found. It is not so easily found on a recurrence of hæmorrhage some hours or days afterwards. To seek for the vessel then, is a new operation to the patient, and a second most troublesome and discreditable one to the surgeon. It was not his fault that the vessel was divided, but it was his fault that it was not secured.

But if the fistula extend too far for the knife to be used with certainty and security, what other means can be adopted? The following resource may be tried. A flexible metal wire may be pressed through the fistula, and brought out and twisted at the anus; and by turning it daily more and more, the upper part of the intervening substance may be gradually ulcerated through; and it is found that as the wire slowly cuts itself out, the upper part of the original fistula has been considerably reduced; the rest may be divided in the way already described.

Simple sinuses opening upon the perinæum, and leading beneath the skin, or not running deeply, are far from the easiest to cure—opening the other end, injecting with lime-water or the black wash, may be useful. If they exist, however, near the sphincter, a division of the muscle is necessary to attain the local rest required for their healing.

But can nothing be done without an operation? A few slight and recent cases may be brought to heal spontaneously, and in all considerable comfort may be obtained.

The first and great thing is frequent, large, and perfect ablutions in tepid water, first with a little soap mixed, then simple bathing with water alone, and at last the water nearly cold. This simple measure is not less salutary than refreshing. It is, indeed, in many cases absolutely necessary, in order to remove the foul and acrid secretion, which is liable to collect about these parts.

The next thing is the use of the confectio piperis comp :—half a drachm at night for a fortnight, which excites some warmth and action in the part.

Occasionally the rectum bougie, introduced from three to four inches, and remaining in the part from half an hour to an hour, gives a sensation of ease and increased tone, and is certainly beneficial.

To these means may be added the injection of a pint of cold water every evening. Everything that promotes the cleanliness of the parts is useful.

So far for the simpler forms of fistula. The proceedings are not always so plain in the more complicated cases.

When the external orifice of the fistula is removed to a considerable distance from the verge of the anus—as far as the buttock, for instance—is it necessary to divide the whole length of this tract? I do not speak of those cases in which the external opening is not beyond an inch or an inch and a half of the anus. Here the sinus may be divided in its entirety. A more extensive division is a serious matter. Besides the additional pain and loss of blood, it takes some time for the wound to granulate and heal, and loss of time is a cause of loss of temper and money to the patient. In such cases the following plan may be adopted :—Introduce a director through the whole length of the fistula, cut down to the groove in it, from half an inch to an inch from the anus, then remove the director and re-introduce it through the wound into the gut, and complete the operation in the ordinary way. The sinus beyond will then generally heal spontaneously.

In the cases where many sinuses exist, a condition which has been compared to a rabbit-warren, it requires the exercise of a good deal of care and discrimination to find out the exact condition of the parts. Sometimes there is one primary fistula communicating with the bowel—the original and main sinus, into which the secondary sinuses enter; sometimes these sinuses pursue separate courses, communicating with the bowel by separate openings. Finally, a fistula may exist on each side, and communicate with the gut by opposite openings, or a fistulous tract may describe a semi-circle—like a horse-shoe—around the anus, with an opening into the bowel at each extremity.

Now, in the first of these cases, we must try to find out the original sinus, divide it, and the secondary ones will then heal. When the case is complicated by the number of fistulæ, it is better to make two operations. It is easier to secure all the required results of a limited operation, than where too much is done at once, not to mention the danger attendant on all operations, which is increased by their magnitude and complication.

As a rule, no operations are attended with less danger than these upon the rectum. And for this reason probably, that they directly relieve and remove a prior source of irritation greater than that which they directly excite. Where fistula ani is complicated with urinary fistula, it is better to cure the latter before meddling with the former. A patient will sometimes consult a surgeon, stating that he has often passed matter with his motions, and has occasionally perhaps noticed a little swelling in the anal region. Upon examination, he is found to be labouring under incomplete fistula—a sinus communicating with the bowel, but without any external orifice. In these cases a tumour close to the bowel is occasioned by the gradual collection of matter; this empties itself into the gut, and the swelling subsides, only to reappear in a few days. We can sometimes press a little matter from the swelling into the bowel. The remedy is clear: make an opening into the part, insert a director and divide the fistula from the internal opening downwards, cutting the fibres of the sphincter.

It is now quite certain that in a few cases of fistula there is no internal opening at all, and when it exists, it may not be detected by repeated examination. The patient becomes dissatisfied with delay, and we must then make an artificial opening into the bowel above the sphincter and divide the septum, including the muscle in doing so.

It is no doubt true, as Mr. Tufnell and Mr. Henry Smith have pointed out, that stricture of the rectum sometimes co-exists with fistula. The detection and treatment of the stricture then forms an essential element in the case. The connection between these diseases may be, perhaps, only a casual one, for it is not quite clear how a stricture of the rectum, when situated beyond the internal opening of the sinus, could cause or influence the formation of fistula. The case is not at all parallel to that of perinæal fistulæ, consequent upon stricture of the urethra. In the latter, the sinuses communicate with the urethra beyond the strictured part, and form subsidiary channels for the escape of purulent matter and urine; but it is often not so in stricture of the rectum, although sometimes it is. However, the practical fact to be borne in mind is, the occasional occurrence of the two diseases in the same subject, and that then, both will require appropriate treatment.

It sometimes happens, though fortunately very rarely indeed, that the section of the sphincter muscle in the operation for fistula is followed by a loss of contractile power in it. Generally too, this is temporary only, the muscle regaining its power after cicatrization; but this does not always happen, and then the occurrence becomes a source of extreme discomfort and grievous distress to the patient.

LECTURE XIII.

STRICTURE OF THE RECTUM.

THIS complaint is a source of considerable emolument to quacks, whose proceedings in it are very simple. Having elicited from the patient that he has some uneasiness in that region, or cause of complaint, the quack introduces a bougie into the gut, and passes it upwards till it strikes against, or is fixed upon the os sacrum. "There," says the quack, "is the stricture, and the pain I have put you to arises from the morbid sensibility it occasions." And thereupon, the patient whose mind is fully satisfied of the reality of his affliction, undergoes one course, or a recurrent spring course, or a continual life-long introduction of rectum bougies, according to the patient's length of purse and the elasticity of his or her credulity.

The patient at the same time is often the better, barring the pain, under the quack's hands. His mind is relieved, he is careful in diet, he takes medicine occasionally, and the introduction of the bougie is useful if he has chronic piles, or indolent and irritable mucous membrane. The last is the common condition, suggesting the idea of stricture. The patient's bowels act very irregularly; sometimes he goes to the water-closet three or four times a day, and passes only at each time some scanty, narrow, scrap-like evacuation. He thinks that all his forcing could get only so much through the stricture, when there was in fact nothing more in the intestine. Every now and then, in the irritable intestine, a single driblet, or fractional instalment of a motion, is transmitted to the terminus of the gut. There is an insufficient bulk of fæces, and there is irritable action of the bowels. The latter, the patient has aggravated or brought on by attending to this function and the feelings going with it, and by trying continually if he can now get a better relief. This leads in time to the establishment of a constant sense of uneasiness in the sigmoid flexure of the colon, to an increased secretion of mucus, which is discharged either with the scanty evacuation or alone. This combination of symptoms is not uncommon in those who have resided in tropical or warm climates, and suffered from hepatic derangements and irregular bowels. The patient is willing enough to believe that he has stricture. It clears up his doubts about himself, and he is happy that there is nothing worse behind. Surgeons of repute have been occasionally led to view this state of things as actually often attended with positive spasm, or as constituting *spasmodic stricture of the rectum.* And indeed, this opinion is so far defensible, that the fibres of the rectum act with preternatural force in such cases, and present some obstacle even to the introduction of a bougie; easily overcome, truly—but certainly *there.* But then this spasm is not of one ring of fibres, but general, and does not correspond with our notions of spasmodic stricture elsewhere. It is only general irritability of the canal.

The use of the bougie is not to be recommended in such cases. What is indicated, is restoring the secretions, improving the digestion from the stomach and liver downwards, by diet, fresh air, exercise—if need be, by aperient medicine, or the combination of tonics and aperients, by the use of injections, at first tepid, afterwards cold. Still, there is no great objection to passing a bougie once or twice to satisfy the patient that there is no stricture, and the surgeon that there is no local cause of irritation of any kind; and if the use of the instrument is followed by relief and comfort, there is no reason why the patient should not himself use it occasionally in the morning before rising for half-an-hour, or at any other time.

Nevertheless, stricture of the rectum is not a fiction. This form of local disease sometimes manifests itself; but it is of rare occurrence. Where a mechanical narrowing of the rectum exists, it is unfortunately often due to cancer; but we have now to do with genuine stricture. The question is not yet settled as to the mode of origin of stricture in any of the mucous passages. It is possible that the narrowing may commence in a sort of cramp of the muscular or other irritable fibre surrounding the mucous canal. I believe that stricture of the rectum may originate in two ways. 1st, and most frequently, by a chronic inflammatory action; 2ndly, as the sequela of ulceration. The ulcers arising during typhoid fever and dysentery very rarely indeed lead to a contraction of the gut on their cicatrisation, because the gland structures are chiefly affected. Softening and ulceration ensue, followed by a destruction of the glands and the effused products, leaving an ulcer behind, which has reached sub-mucous tissue only. A kind of new membrane is then formed. This lines the floor of the ulcer, and its edge becomes dove-tailed, as it were, between the mucous and sub-mucous coats. When however, the muscular fibre forms the base of an ulcer, contraction may take place; or, whilst ulceration is taking place at one part, a large amount of lymph may be thrown out into the tissues around, and may as it becomes organised undergo condensation. Narrowing and contraction of the bowel therefore ensues as the ulcer heals.

In some cases, the stricture of the rectum is due to a syphilitic taint. Most hospital surgeons have met with such cases. When condylomatous growths exist about the anus, this may be suspected. Not that such growths are by any means necessarily syphilitic, for warty excrescences may be produced by the discharge of mucus from the bowel, and by the moisture and heat of the parts. Still, it is well to be alive to syphilis as a cause, and to ratify or correct our opinion by a few judicious questions.

Let the origin be what it may, certain it is that established stricture is greatly indebted to chronic inflammatory action for its physical character and growth. In every case,—in the urethra and vagina, in the œsophagus, as well as the rectum,—the narrow ring of established stricture displays a permanent thickening and rigidity, the evident result of infiltration of the tissues adjoining the thin mucous surface with coagulated lymph. The sub-mucous coat of the canal is the seat of the original thickening and induration, which, from length of time and increased irritation, may extend beyond. The true mucous coat, the thin, fine, inner lining, remains but little changed.

In the rectum, the common seat of stricture is from two to four inches from the orifice. In almost every case the narrowing is near enough to the surface to admit of being felt by the finger, or seen with the speculum. The surgeon measures with his finger the degree of contraction, and the length to which it extends. His touch satisfies him that it is not cancer. It is a firm, smooth ring, with an unbroken surface—with neither the harsh surface of the one kind of cancer, nor the irregular, projecting, fungus-like masses belonging to the other. The stricture is such a smooth ring as might be produced by tying a piece of tape around the healthy intestine, leaving an aperture of half-an-inch diameter. The stricture is not always circular however; sometimes the smooth induration is greater and more permanent in one of its aspects than on the other, and when it extends around the circumference of the bowel in an irregular and unequal manner, the passage may be no longer direct but tortuous.

The condition of the gut above the strictured part will vary, of course, with the degree and duration of the obstruction. In general terms it is one of hypertrophy with dilatation. A gradual increase in the calibre of the bowel takes place, and with it, hypertrophy of the muscular coat, with or without inflammatory changes in the lining membrane and sub-mucous tissue.

Sometimes small abscesses form at this dilated part, leaving ulcerated openings in connection with sinuses, which may terminate about the perinæum or buttock. Such fistulæ may be then compared, as to their origin and cause, with those urinary fistulæ which communicate with the urethra behind a stricture. Frequently, however, when abscesses and fistulæ accompany and complicate stricture of the rectum, they communicate with the bowel below the seat of stricture. The occasional combination of these two affections is worth carrying in mind, on account of the practical bearing it has upon the treatment of what may apparently be a simple fistula in ano.*

Now this affection is not a very rare one, and it is perfectly identifiable. The nature of the complaint can be in almost every instance determined by local examination; no doubt stricture may exist higher up in the intestine—about the sigmoid flexure for example—and so may cancer, or the surface may be ulcerated. But these cases are fortunately very rare—fortunately for the surgeon, as well as for the patient, as nothing is so painful to the surgeon as to prescribe and act vaguely and in the dark as to the real nature of a disorder.

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* Sir Benjamin Brodie puts all this very clearly: "Where abscesses have formed in the neighbourhood of the gut, it is of no service to lay them open. I have told you, on many occasions, that if abscesses are connected with diseased stricture, they are not likely to heal; and you only make the patient worse by laying them open, there being, of course, a much greater extent of raw surface after the operation than before. If these abscesses are to be healed at all, it can only be after the stricture has been fully dilated," p. 586, vol. iii, of the works of the late Sir Benjamin Brodie, Bart., edited by my friend, Mr. Charles Hawkins.

Stricture of the rectum is a disease of middle life: rare in youth and old age. The symptoms are the following:—The patient brings a history of more or less habitual constipation, with an increasing difficulty of defæcation; the fæces are passed either in a half liquid state, or in short flattened fragments; a sense of insufficient relief when the bowels have acted, and a disposition to repeat the attempt several times in the day. When the stricture, through time, neglect, and irritation, has become very narrow, the sympathies of the part are, as it were, called out, and there is a sense of weight and tightness at the sacrum, uneasiness behind the left groin, and pain and weariness of the thighs; mucus is occasionally passed alone, or with the fæces, but blood rarely. The mucous membrane of the part often becomes irritated or excoriated, and then a burning sensation succeeds each stool, and often lasts for some time. The symptoms become seriously aggravated, when it happens that any quantity of solid fæces is lodged above the stricture. There is then obstruction with all its consequences; of which, in connection with the rectum, I shall have to speak separately, and shall take occasion then to advert to this particular complication.

The treatment of stricture of the rectum is simple, and, on the whole, successful. It consists in the use of the bougie to dilate the contraction. The best for this purpose are of indian rubber. They should be slightly conical. The secret of the treatment of stricture is *the greatest possible gentleness*—never to give pain or irritate the part. Thus, the bougie is not to be left in too long, nor to be introduced too often. It may be left in the stricture for half an hour every third day, in almost every case. In many the instrument may be passed every other day; with some every day. A larger and longer instrument is continually to be substituted for the last size; or the conical instrument is to be insinuated always a little farther and farther. Under gentle and not too frequently repeated pressure of the instrument, the stricture yields, the adventitious lymph is absorbed, the aperture becomes really larger, the induration less, and the intestine is sensibly tranquillized and calmed. If the surgeon attempts to go too fast, and to force the stricture rapidly, the effects are just reversed: the stricture becomes firmer, narrower, more irritable, and for a time the use of the bougie must be abandoned. If great force is used, the bowel may be torn through; and, even without this, from mere forcible overdone stretching, peritoneal inflammation may be excited, which may cost the patient his life.

Every now and then—but such a case is unfrequent—the stricture penetrated by the finger is extremely sharp and hard, and it will not yield to the bougie, or seems to require an infinite time for success. In such a case the surgeon may divide the stricture *forwards* a quarter of an inch, and introduce a bougie for ten minutes every day, to preserve the enlargement which he has gained. Deep incisions are to be deprecated, as involving danger from hæmorrhage; but there is no objection to "notching" the stricture superficially in three or four places, if the single incision be found inadequate or insufficient. When the stricture is low down, no harm might arise from rupturing it by forcible dilatation, in the same way that is done in stricture of the urethra; but I am strongly opposed to the use of various instruments of great power for the treatment of stricture, particularly where it is higher up in the bowel. A well-known writer on diseases of the rectum mentions a case wherein death ensued from peritonitis produced by the rupture of the gut under the force used—hydraulic pressure.

So far for the mechanical treatment of these affections, but the medical must not be lost sight of. By means of suppositories of soap and opium, injections of tepid water, small doses of castor oil, or cod liver oil where the patient's health and nutrition are affected, we may the meanwhile alleviate the symptoms while we are removing their cause.

Under the title of "An unusual form of Stricture of the Rectum," Sir Benjamin Brodie has described a contraction of the gut which ought, he conceives, to be distinguished from ordinary stricture.

Most surgeons in extensive practice have been able to corroborate the accuracy of his description. It occurs chiefly in women who have borne children, and, in the majority of cases, it has shown itself some time after a difficult labour. The affection is insidious, and commences with pain in the rectum and back, a discharge of mucus from the anus, and some difficulty in passing evacuations. These symptoms increase in severity until the pain is constant, becoming extreme after every evacuation. The discharge, also increasing in amount, becomes bloody. If the case continues to progress, abscesses form in the areolar tissue, about the gut. These shew no disposition to heal, and as one forms and bursts about the perinæum, anus, nates, or other parts, it is succeeded by another and another; hectic fever is induced, and the patient's powers succumb beneath this formidable train of symptoms.

The physical characters of this affection are somewhat peculiar. At an early stage of the disease the inner surface of the rectum feels irregular and warty, as if studded with numerous small excrescences. Generally, says Sir Benjamin Brodie, whose description I am mainly following, some small flattened excrescences exist at the same time about the margin of the anus. The mucous membrane in the interstices between the excrescences is occasionally ulcerated. In some cases Brodie found this state of the mucous membrane to exist without any contraction of the gut whatever; so that he holds the stricture to be an accidental, and not a necessary concomitant of the disease. Still, in the great majority of instances, there is a circular constriction of the bowel about one or two inches above the anus, or there is a contracted state of the anus itself.

Success in the treatment of these cases almost entirely depends upon the period at which it has been undertaken. When the disease has led to great structural changes in the gut, and much suppurative action about it, we may be unable to effect a cure. The means to be adopted are such as have been already pointed out. The mechanical treatment will require all our gentleness and tact, for the diseased bowel is extremely tender and irritable, and resents all rough or precipitate attempts at dilatation. With care and gentleness, however, there are no cases of the kind in which our art gives greater relief.

LECTURE XIV.

OBSTRUCTION OF THE BOWELS, AS CONNECTED WITH THE RECTUM.

LONG-CONTINUED obstruction of the bowels is fatal to life; but there is a vast difference in the degree of rapidity with which the fatal effect is brought about in different instances. The commonest cause of obstruction in surgical practice is strangulated hernia. Then there are some cases of obstruction in which death ensues in forty-eight hours from the commencement of strangulation; others, in which nothing menacing shows itself for a week, and then two, three or four days intervene before the termination of the case. In the first class of cases there supervene tenderness, distension of the abdomen and vomiting, in three or four hours; in the second there are no symptoms but the tumour, some general indisposition, and a knowledge thereupon that all is not right. There is little or no action of the bowels, and that is all. The wonder is that the patient was not seriously ill earlier, or that having endured the inconvenience so long, it should now be accompanied by such serious symptoms. In fact, however, in either case there is, sooner or later, peritonitis, and death ensues from that cause.

1. In infants with imperforate anus, and in whom the intestine is so greatly deficient that no operation

reaches it, it is wonderful how slowly death takes place. They live two, three, or four weeks, or even longer; at first not suffering at all, then uneasy, the belly swelling, then vomiting occasionally, the belly becoming more tumid and tense as the rest of the frame shrinks and wastes, and so in time they die.

2. Comparable with this is the case of obstruction in elderly persons, almost always women, arising from accumulated fæces in the rectum. The patient is uncomfortable, uneasy, distressed; the bowels have not been relieved for several days, nor after waiting, or taking purgatives, does relief take place. The belly becomes rather tumid, not very tense, the pulse irregular, there is delirium at night, the patient's strength fails; she has no appetite, or taking food excites vomiting; she is unaccountably wrong; she becomes weaker; death ensues.

Case.—A lady somewhat advanced in age, and who had from her youth a bad distortion of the spine, complained for years of constipation, flatulency, a sense of weight in the pelvis, and of feeling habitually uncomfortable. Upon one occasion she experienced symptoms of piles, and I had an opportunity of examining the rectum. Immediately above the sphincter, and within easy reach of the finger, was a large mass of indurated fæces, which, judging from the portion that could be felt, must have been larger than an ordinary cricket-ball. During the examination a portion of the mass was detached, and extracted. The odour was intolerable. This lady made several appointments in order to have the accumulation removed, but upon each occasion, when the time arrived, she became too nervous to submit to the operation. As time advanced she became weaker, and with the weakness her nervousness increased. After several years of much discomfort, her strength failed, her pulse became irregular, and she died with symptoms of bronchitis.

Many such cases that would have admitted of complete relief by surgical means, the obstruction being purely mechanical and removable, are represented from first to last as cases of obstinate constipation, and the patient is said to die at last of unremoved constipation of the bowels. But constipation of the bowels may mean the want of fæces, the absence of intestinal secretion, and then it is analogous to suppression of urine. Unquestionably great disturbance, death even, may ensue through that cause. But here the condition of things is reversed; there is no lack of fæces; the bowels are actually obstructed by the enormous accumulation of their contents.

Women are very apt, from motives of delicacy, to retain the fæces in the rectum. The rectum, hence, becomes large and capacious, and with age proportionately indolent. If the fæces happen to be less stimulating than they ought to be; if there is a deficiency of what is commonly called bile, for example, there may exist in the great intestine a large quantity of clayey or putty-like material, which does not irritate the bowel enough to lead to its expulsion, and the rectum and sigmoid flexure of the colon become completely plugged up by some pounds of a soft tenacious substance. Then the course of symptoms, which has been above described, supervenes, and the patient sinks under them. Many such attacks are overcome by active purgative medicines, and, unless things have gone very far, the exhibition of croton oil will often produce the requisite evacuation; but there is a time when the violent irritation of this drastic medicine, used too late to overcome the accumulated obstruction, only precipitates the end.

In all such cases it is most important to examine the condition of the rectum. In many instances the canal of the intestine will be found plugged up with tenacious fæces, which extend to near the anus. The distended rectum has lost its expulsive power, and there is no force from within by which the offending matter can be dislodged, but it may most easily be removed by a well rounded scoop, assisted by the repeated injections of small quantities of water. The finger introduced, by which the nature of the obstructing material is identified, will often serve better than any instrument to detach and bring away the lower strata of the accumulation.

3. A similar accumulation to the last described is liable to take place in children in whom there has been a small perinæal opening artificially made—the anus having been naturally deficient—on the fæces becoming more solid. And in these cases, it is sometimes necessary, not only then to make a larger artificial anus, but by a similar operation to scoop out and wash away the accumulated clayey fæces, which would otherwise form a source of mortal obstruction.

4. In cancer of the rectum, the fatal termination is often brought about by obstruction of the bowels; and it is almost always much accelerated by the frequent recurrence of such attacks, which help to wear out the patient's vitality. And great comfort and relief of great distress may occasionally be given by passing a long flexible tube, with a rounded end, and large holes in it, through the mass of disease into the fæces accumulated in the second intestine above. Then, by gently stirring and breaking down the mass of fæces, aided by throwing in, from time time, a few ounces of tepid water through the tube, the accumulated fæces may be reduced to a softer consistence, or a fragmentary state, in which they can pass through the smaller and contracted scirrhous portion of the canal.

5. In simple stricture of the rectum, such an occurrence as serious obstruction from accumulation of fæces above the stricture, must be extremely rare, and would be obviously most easily removed in the way just described.

6. But every now and then stricture occurs in the colon above the rectum, and in the course of time an attack of obstruction is liable to take place. Even in such a case, if the true idea of the disease be seized, by means of a long elastic tube carefully introduced in a similar manner, the obstruction also may be obviated. Nor is it always so difficult, as might be at first expected, to identify the particular cause of obstruction. For the patient in these rare cases either knows it, or suspects it already. For years he has been liable to confined and irregular

bowels, and his sensations have enabled him to identify a point of the colon as the seat whence the mischief has proceeded. So the first supposition of ileus, or of internal strangulation of the intestine is set aside, and the surgeon gives his attention first to make out the probability of the case being stricture of the colon, then to reach and pass it with the flexible tube.

When an obstruction to the fæcal flow has been caused by organic disease of the larger bowel, it is, unfortunately, very frequently of a cancerous nature. It may be due to simple stricture, or to intussusception. If it depend upon the last-mentioned cause, we may sometimes detect the inverted bowel descended into the rectum by careful examination, and our efforts must then be directed to its return. This may be accomplished by injecting warm water in a slow and equable stream, or by pumping air up the bowel, so as to carry the inverted portion upwards. In the remaining cases an exact diagnosis of the nature and, above all, the seat of the obstruction is the main point, if we are to attempt any operative interference. Now what are the facts by which we are to be guided? There is the history of constipated bowels, followed by complete obstruction; the feelings of the patient himself as to its seat; the secretion of urine continued, at any rate until vomiting becomes an urgent symptom;* the impressions gained by careful palpation and percussion of the belly; and, lastly, the evidence afforded by the passage of a long elastic tube, and the injection of water. These things, carefully weighed and considered, will generally direct us to the seat of obstruction. In passing a long elastic tube we must remember, of course, the natural obstructions in the way, such as the promontory of the sacrum and folds of mucous membrane getting in front of the tube. Let it be passed very gently, occasionally withdrawn a little, and slightly rotated, at the same time that we inject a stream of fluid through its extremity, and no difficulty will be experienced from these causes. But we will suppose that some obstruction is found, beyond which neither instrument nor fluid will pass, and that the latter returns uncoloured and inodorous, we may then conclude that the seat of the obstruction has been reached. In the same manner it is proper to suggest here, that at a point much higher than the rectum, even at the commencement of the colon, mechanical obstruction may take place through accumulation of fæces.

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* The reason why the urine continues to be secreted in cases where the seat of obstruction is low down, and becomes diminished or suppressed where this is high up, is, that vomiting

The diseases known as peri- and endo-typhilitis, are of this nature; these may often be removed by local depletion and fomentation, combined with purgatives. Sometimes, inflammation of the areolar tissue ensues at this part, ending in abscess. This may be in consequence of a perforation at the posterior part of the cœcum or its appendix; or the irritation caused by a distended bowel may give rise

ensues earlier in the one case than the other, and the absorption of fluids, therefore, no longer takes place through the stomach and intestines.

to a form of pelvic cellulitis, which terminates in an abscess that opens into the bowel and through the integuments also. In one of three fatal instances of this affection witnessed by Dr. Marston, there was the history of a chronic constipation, followed by fulness and tenderness in the right iliac region. This was succeeded by a well-defined, boggy tumour, immediately within the iliac bone, slightly above Poupart's ligament. Abscess and sinuses followed; Dr. Marston was enabled to determine the communication between the bowel and abscess by the detection of starchy, and other vegetable matters, in the discharges when microscopically examined, and the pus issuing from the sinuses had a fæcal odour, and gave a blue reaction with iodine. An ulcer was found after death to have perforated the cœcum.

In January, 1866, I had a patient under my care in St. George's Hospital, in whom an abscess formed on the left side of the pelvis after childbirth. This abscess opened into the rectum on the one hand, and above the crest of the ilium on the other.

Obstruction to the bowel, in cases where the impediment is high up in the colon, is of slow invasion. There have often been small accumulations before. The patient has been often attacked by indisposition and confined bowels, and after taking many doses of medicine has at last obtained a large relief, passing, among other fæcal matters, a quantity of scybalæ. Now his bowels have been confined, for weeks, perhaps, but have become at the same time very irritable, and he is often led to try to have a motion, and little or nothing comes away. The belly is rather swollen, some greater and more solid fulness is detectable on the right side than on the left, that is to say, in the place of the head and ascending portion of the colon. The patient has no appetite, rejects food, perhaps, as soon as it is introduced into the stomach ; he is uneasy and feels himself reduced in strength, and seriously ill ; his tongue is furred, but his pulse is not excited, nor is there evidence of febrile or inflammatory action. He is pale, bloated, swollen.

The only way to relieve this threatening state is to wash out the whole of the great intestine, by means of a large injection of warm water, slowly pumped and forced along the canal. This will penetrate among and loosen the cohesion of the scybalæ, and when they begin to move all will come away. It is to be understood, of course, that many a slighter attack will yield to purgative medicine, which is for such the proper remedy. Sometimes the same mechanical obstruction will be caused by accumulations in the colon of insoluble substances that have been taken by the mouth.

In one case that I heard of, the material was cotton, which had been swallowed with some ravenously eaten food after long fasting, the cotton not being easily separable from the food with which it had been packed. The husks of oatmeal will thus accumulate, and in the cow and horse, hair licked off the sides by the animals themselves will form mechanical obstructions.

It is obvious that sometimes, where the cause of the obstruction is permanent, we can only afford temporary relief, or none at all, by the means suggested. The only method then left open to us is the establishment of a vent for the fæces above the seat of obstruction. The nature of the case and our inability to compass its relief having been thoroughly determined, then, the sooner this is done the better, if it is to be done at all. In cases of malignant disease it is cruel to attempt any operative interference in an advanced stage, when the patient is a skeleton and his days are plainly numbered; and so in other cases, it is useless to operate when the symptoms indicate that the patient is sinking under the harm that has already been done. An operation must be undertaken at a proper time, to establish an artificial anus; and the best site for this is in the left loin. That is the situation recommended by Mr. Curling, and his experience of this operation exceeds that of any other surgeon. The patient is to be placed on his face, or nearly so, with a pillow beneath the lower part of his belly. A point is selected about two fingers breadth above the crest of the ilium, and midway between its anterior superior spinous process and the spinal column. The incision is to be transversely outwards, from the outer margin of the erector spinæ muscles, for four or five inches. All the muscles are to be divided down to the transversalis fascia; this is to be pinched up and divided on a director to the same extent. Then the posterior aspect of the colon is to be sought for, seized, and drawn outwards to the wound with forceps, and a longitudinal opening of an inch or rather more is to be made into it. The divided edges of the gut are then to be tacked to the outer wound by four metallic ligatures passed through them to the external integument. This keeps the artificial anus near the surface, maintains its patency, and prevents extravasation of its contents. The presence of much fat may so obscure the position of the bowel as to render the search for it tedious, so may a contracted state of the intestine, but under ordinary circumstances it is not a difficult proceeding.

In a case in which the obstruction in the bowel was complete for many days, I performed the above-mentioned operation, but instead of the colon a portion of small intestine, greatly distended, was seen through the peritoneum. This portion of bowel was opened, and stitched to the integument; a very copious flow of fluid fæces occurred, and the patient for a time experienced relief. He died, however, a few days afterwards, when it was found that the small intestine had formed very firm adhesions to the edges of the wound. There were no indications of any undue inflammatory action in this situation; at the seat of stricture, however, the small intestine had become completely ulcerated through, and some fæcal matter had from this part escaped into the peritoneal cavity. The preparation is preserved in the museum of St. George's Hospital.

LECTURE XV.

AFFECTIONS OF THE SPHINCTER ANI.

THE diseases specially connected with the sphincter may be treated with regard either to the morbid alterations upon which they depend, or to the physical and mechanical alterations produced. I have adopted the latter arrangement as being of a more practical character, and as not necessarily involving any change of the system with each new idea regarding the intimate nature of the different morbid products which may be produced by disease.

The office of the sphincter is two-fold; first, in regard to the bowel itself; secondly, its contents. It supports and confines the bowel within the lax chamber in the pelvis; it alternately retains or allows the contents of the bowel to escape. These are its purposes and actions in health. But in disease, the sphincter is liable on the one hand to lose its tone, on the other to have its contraction preternaturally increased. Serious inconveniences arise from either cause. The simplest are those which flow from

Relaxed Sphincter.

This is a partial palsy, and often accompanies partial palsy or weakness of the lower extremities, but it may exist alone. The consequences are very distressing. The fæces, when at all liquid, come away involuntarily ; and when the patient strains at stool the bowel protrudes, inverted, in the state of prolapsus. Even when the patient stands or walks the same distressing inconvenience is liable to occur. The complaint manifests itself as often in middle as in advanced life.

Two indications of treatment present themselves. The first is to restore the reflex functions of the spinal marrow ; to invigorate the nervous system ; to combat the disease as partial paraplegia from deficient innervation. The use of the sitz-bath ; the application of cold followed by friction to the hips is here often beneficial ; and an occasional blister over the sacrum, or the internal administration of strychnia and iron, &c., are also useful. The second indication, the purely surgical one, is to supply the diminished local or muscular support by making the large and flabby anus smaller and more rigid in itself. This is accomplished by an operation invented by Dupuytren. Some folds of skin which radiate from the anus are included in strong forceps with narrow, blunt, curved ends. These forceps can be fixed at pleasure by a nut. Two or three of these folds of skin, extending quite to the anus, are to be seized and fixed ; and then each is to be cut through at the edge of the forceps. The wounds quickly heal, and their healing is attended by some degree of contraction and hardening of the anus, and this in slight cases restores to the patient comparative security and comfort. When the operation fails, which it too often does, we may again endeavour to impart firmness and procure contraction of the aperture, by dividing and removing a portion of the sphincter muscle and bringing the cut edges together by silver sutures. The patient may also sometimes derive considerable comfort from the use of an ivory compress and spring, the former covering and bearing up, as it were, constantly against the anus.

By far the most convenient form of support, where it can be worn, is an instrument made with a cylindrical stem, slightly curved backward, so as to fit the natural shape of the bowel, with a bulb at one extremity and a cross bar at the other. The bulb, which should rise rather abruptly from the stem, is introduced into the bowel and rests above the sphincter, which retains it in position. The cross-bar prevents the instrument from passing too far up the bowel, while the stem acts as a support to the sphincter. This contrivance not only prevents the prolapsus of the bowel, but it also enables the enfeebled sphincter to retain its contents.

Case.—An eminent engineer had become much enervated by excessive work, and among other symptoms, the sphincter ani had lost its power. He could not walk across the room without a risk of some of the contents of the bowel escaping, and was for a time consequently prevented from leaving the house. An instrument such as has been above described was made for him, and with it he found he could go about with the greatest comfort, and undertook a long journey without experiencing any inconvenience so long as the instrument was worn.

CASE.—A lady was completely excluded from society on account of having lost control over the sphincter ani. A friend of mine mentioned the case to me, and I gave him a suitable instrument. By wearing it she is enabled to go into society like other people.

The size and shape of these instruments should be adapted to particular cases. If the muscle is much relaxed, the stem should be thicker. If the upper fibres have descended, so as to be contained within the lower, the stem should be shorter than usual. It would be a great mistake to suppose that the same instrument will suit every case. The common fault of such instruments is, that the stem is not sufficiently long to allow the bulb to rest fairly above the sphincter, in which case the upper fibres grasp part of the bulb, and tend to force it upward, while the cross bar keeps it down. The instrument then becomes a source of irritation instead of a means of relief. Various kinds of ointment may be applied upon the support. Those which have been attended with the most satisfactory results are such as have contained tannic acid or cubebs.

The true prolapsus of the rectum is in reality a very different phenomenon from that protrusion which ensues from internal piles. In both cases there is a prolapse no doubt, but in the latter more or less mucous membrane only descends with the hæmorrhoids, while in the former all the coats of the bowel are prolapsed. This affection is common enough in children, and relatively rare in adults.

Here the sphincter only seems in fault; it does not, it is true, accomplish its first purpose, but, nevertheless, its tone and quality of action are exactly right.

The ordinary tone and power of the sphincter are not enough to keep the intestine from descending everted, under the influence of long-continued straining, and forcing downward. On the other hand, when the intestine is thus thrust out, the ordinary tone of the muscle is in the way, and great difficulty is often experienced in getting the intestine returned. In prolapsus from piles the patient has only to lie down, and the bowel will be spontaneously drawn through the lax sphincter, or may easily be passed back. In prolapsus, involving all the coats of the bowel, the patient is only able, with some minutes or half an hour's labour, to effect this object.

Prolapsus ani may be said in every case to proceed from one and the same cause, namely, an altered relation between the pressure upon the bowel and the supporting power. So, in palsy of the sphincter, the ordinary pressure to which the bowel is exposed is sufficient to thrust it everted out of the anus. And when the sphincter is in its natural state, to account for the phenomenon we have only to inquire what cause has been brought into operation to increase the pressure from above.

The mechanical means will always be increase of strain by the abdominal muscles and diaphragm, the causes provoking this increased strain may be various.

In children, for instance, worms, stone in the bladder, or polypus of the rectum, often originate prolapsus. In them, too, the urinary organs are not fully developed, and occupy an abdominal rather than a pelvic site; the rectum is less supported and more moveable, and hence peculiarly liable to become everted during the straining attending diarrhæa and irritability of the bowels.

A common cause, both in children and adults, is costiveness. A scanty fragment of fæces is passed; the patient goes on straining in the expectation of getting rid of more. But there is no more to be got rid of; yet he has the sensation, as if there were something still lodged in the rectum. It is a false sensation, or the result only of the lower part of the intestine being pinched and irritated; and he continues to strain, and something is extruded. It is a bit of the bowel, and every day more and more is forced down, until at length perhaps, every time the bowels act, four or six inches of intestine project everted. And the patient does not feel relieved till this is the case. He has then to commence a second operation, that, namely, of replacing the bowel, which has been displaced. And for this purpose he has to lie down, and it may take him from ten minutes to two or three hours before he accomplishes it. So the action of the bowels is a grievous operation and tax upon him, and he probably ventures only once in two or three days upon its performance; and he generally contrives to get it done at night, that he may thereupon go to bed, and get the complete replacement partly effected in sleep But during the day time he is never quite safe. The bowel is then large, and disposed to protrusion and eversion, and the anus lubricated with mucus. When he walks he is in constant danger of suffering from prolapsus. He finds in time a mechanical remedy for this in some kind of rectum support.

The first thing in the treatment of prolapsus is to get rid of the cause which occasioned and is increasing it.

In weak, flabby children, with large bellies, the general health must be carefully attended to; irritability of the bowels and diarrhœa must be overcome, and any disorder of the assimilative organs must be corrected by medicine and a well-regulated and good diet.

The cause, as has been explained, is very frequently costiveness. And it is, unluckily, in confirmed cases of costiveness, much easier to talk of obviating the ailment, than to do it. The remedies upon which reliance have been placed are, brown meal bread, exercise, medicine, such as the occasional exhibition of small doses of the purest aqueous extract of aloes with a little extract of belladonna after the dinner meal; the administration of strychnia with arsenic or phosphate of iron, and the frequent use of cold water enemata, where the digestion and muscular tone are impaired, and change of air where the general health appears to have suffered. The patient should also remain horizontal as much as practicable, and learn to evacuate the bowels in that position. Then, the costiveness being removed, or in the course of removal, another thing is to be thought of, namely, the habit of the intestine to become displaced. This is the result of lax attachments of the parts, and the habit has to be restrained, the preternatural laxity to be got rid of.

Both ends may be obtained by the same means —by stimulating the intestine, heating it slightly, or making it sore, and exciting points of local inflammation.

It is sometimes sufficient for this purpose to inject into the intestines before rising 3 to 6 drachms of an astringent infusion, or to stimulate the rectum by giving the confectio piperis comp, two or three times a-day. In slight cases, the production of superficial sloughs of the mucous membrane near the skin, by the application of strong nitric acid, produces sufficient contraction to prevent the descent of the bowel. But if these means fail, the part may be made sore and excited sufficiently in the following method. Two or three small portions of the mucous membrane are to be pinched up with forceps and tied, each with a single strong silk. The portion included may be about the size of a silver penny. The silk is cut close to the knot and the part returned. If the sphincter be relaxed and flabby, exerting but little force upon the finger when inserted into the gut, it is as well to excise two or three little pieces of skin from the anus at the same time, and bring the edges together with metallic ligature. When the ligature and the included portion of mucous membrane separate, there is left a shallow ulcer, which is for the moment sore; it quickly heals, however. But in the mean time, the part has seemingly been spared in the action of the muscles; being sore, it has instinctively been less hardly borne upon; and afterwards, perhaps, a little consolidation may have taken place about the intestine at the points operated upon. However that may be, in a great number of cases the prolapsus disappears.

Sometimes it happens that the prolapsus has been caused by the irritation of an inward pile. The latter has been habitually first protruded, and then more and more of the intestine has been thrust out after it. The removal of the pile cures the prolapsus.

A surgeon, if sent for on an emergency, very seldom has any difficulty in returning a prolapsed intestine. It takes time, however, from the slipperiness of the folds, which come back as fast as they are put up. An adult patient knows all about this. But mothers sometimes send in alarm for medical advice, when in a young child considerable prolapse has made its appearance, which their nervousness prevents them from replacing.

If however, there is a large mass of hæmorrhoidal induration—a pile, for instance, as big as a French walnut, hard and firm, being the cause and basis of the protrusion—there is sometimes a little difficulty experienced. The parts may have been out some time, and the patient may be alarmed. There is no reason why some graduated force should not be used in such a case; and if the great lump is first returned the remainder follows. It is necessary, however, before any force is used, to be assured that the protrusion comes from within, because surgeons, less accustomed to these cases, have been known to work away to the great harm and damage of their patients, trying to replace a tumour which always was external.

In a few rare cases, the prolapsus is both very considerable and chronic, resisting all attempts at cure. There may be four, six, or even ten inches of intestine protruded which cannot be returned. Great irritation, ulceration, or sloughing of the bowel may eventually ensue, and the patient's life is made miserable. Now, in these extreme cases, the author would act upon the hint which Sir Benjamin Brodie has left us, viz., to apply several ligatures around the gut and excise the protruded portion. No doubt, this is a severe measure, but the patient must be content to run some risk, seeing that the natural course of the disease tends ultimately to a fatal issue, through a long and painful malady. The operation—as Sir B. Brodie has pointed out—is analogous to that which Nature herself performs in certain cases of intussusception of the bowel. In such cases the protruded portion of gut, becoming constricted by the edge of that into which it has passed, sloughs away, as if a ligature had been placed around it.

Contracted Sphincter.

Those descriptions of disease are often the most useful in which extreme strictness of method is put aside, or sacrificed for an arrangement based upon natural and practical relations.

So I have ventured, under the head of relaxed sphincter, to look at all cases of prolapsus ani, although the smaller number of cases of the latter complaint are alone strictly referable to that cause. In the same manner a general view of the present subject will now be taken under the head of contracted sphincter, and a variety of complaints that hang loosely to it may be advantageously considered, which have most important diagnostic and practical bearings to each other.

Two groups of cases naturally present themselves; one where the inconvenient opposition of the sphincter is attributable to induration; the other where it depends upon spasm.

1. Under another heading, that of malignant disease, I have described an ulcer surrounded with induration, commencing on the mucous aspect of the verge of the anus, with a disposition to unlimited extension, so as to occupy the whole circumference of the anus, and spread gradually higher into the intestine. The disease is closely comparable to epithelial cancer of the lip, and is to be treated like it; the part engaged is to be largely and freely excised. The characteristic feature is, that the ulceration bears a disproportionate relation to the induration. The case is not indurated anus with an ulcerated crack or fissure, but an ulcerated anus with a red and hardened base. It is red because it implicates the mucous surface of the intestine. In a yet early stage, there is soreness and more or less narrowing of the anus. The outlet of the bowel is through an irregular edged and somewhat excavated ulcer, which will creep on destroying the surrounding parts.

2. The anus may be narrowed by indurated external piles, which have been described separately. A good deal of general anal thickening and hardening may attend these troublesome little lumps, with cracking of the surface, soreness, excoriation, and occasionally ulceration.

3. The anus may be involved in a general brawny hardening, occupying the adjacent buttocks; the skin thickened and coarse; the passage more or less narrowed. The only cases I have seen of this kind were attended with no ulceration; and after the lapse of many months, during the early half of which period they were condemned as cancer, the disease slowly dispersed.

4. *Scrofulous Disease of the Rectum.*—A gentleman of strumous habit and complexion, who had been under the care of physicians for his chest, and had habitually been subject to excessive perspiration, had a disease of the rectum in 1863. An operation was then performed, and for a time the local symptoms were relieved. In 1865 this gentleman again suffered from his local complaint. A large abscess formed by the side of the bowel, which, when opened, discharged a large quantity of dark brown pus. A communication with the bowel was now found, and the ordinary operation for fistula was performed. The wound healed very slowly. After the lapse of two or three months some caustic was applied, which gave great pain, and appeared to aggravate the disease. Four months after the operation, upon examination with the speculum, an ulcerated livid surface, larger than a shilling, was seen on each side of

the bowel, extending forward to the situation of the fistula. This bled upon the slightest touch, and was accompanied by a sense of dull aching pain whenever the patient had been long in the erect position. The treatment adopted was steel internally, a suppository of cubebs introduced into the bowel every night, an issue in the arm, and the recumbent position during a greater part of the day. The ulcers now soon lost their dark livid appearance, and became covered with bright red granulations, and healed in a month from the commencement of the last mentioned treatment.

5. The anus may be confined and narrowed, rendered sore, and in effect contracted by the growth of common warts. Where they are neglected in the heat, moisture, and irritating secretions of this part, warts are liable to attain a wonderful amplitude and development, forming an arborescent forest, or, to use a more appropriate image, they resemble a small head of broccoli. The first inspection suggests the idea of malignant disease, of fungus shooting out from the extremity of the gut. On close examination the growths are found to spring from the skin at the margin of the anus by many roots. The proper way to get rid of them, when they have attained so great a development, is to clip them close off with scissors with blunt points, bent on the flat, and to touch the wounds with nitrate of silver. Like warts in other parts, they are liable to recur for a time. Cleanliness, washing the anus with soap and water three or four times a day, is the best mode of getting rid of the disposition to their formation.

6. When the system is affected with syphilis the

anus occasionally becomes the seat of one of its manifestations. What in another part of the body would be a hardly elevated blotch of lepra or psoriasis, in the heat of this region, becomes a lump, or commonly a pair of lumps, one on each side of the anus, but of unequal sizes; thick, firm, flattened against each other, sore in time, the surfaces opposed to each other are covered by a white film of mucus, or in the severest cases, become ulcerated. So swelling, hardening, ulceration of the verge of the anus may be brought about, attended necessarily with soreness, aching, pain, as the complaint progresses. The worst cases might certainly for a time be regarded with suspicion, and suggest a doubt that the hardening and ulceration may be malignant, the more so that this outbreak of secondary syphilis occasionally manifests itself alone, without spots on the hands and face to suggest its true nature. A well-informed and circumspect surgeon, however, would at the first examination of the patient be satisfied as to the real nature of the case.

7. The anus is also liable, apart from the preceding maladies, to degenerate into a firm, hard, almost cartilaginous, contracted ring; the opening narrow, the texture gristly ; so rigid that no dilating means will make any impression upon it. There can hardly be said to be swelling; the part is rather atrophied, and degenerated into this fibro-cartilaginous ring, or what it sometimes resembles (only the whole history and mode of the disease is different) is the contracted circular mouth, which is seen in cicatrising lupus of the face. I do not know how this begins,

but there is the firm undilatable ring. Its *accident* is more or less cracking, fissuring, or ulceration, but there is little probability of its running into malignant ulcer. It is, in fact, an indurated stricture of the orifice of the gut, and it will go on for years in this state. The patient experiences great pain on forcing the fæces through this narrow ring, which, of course, has gradually become sore in consequence of the continued straining and pressure against it from within. The case is cured at once, by the operation of dividing the indurated ring laterally. If it is very narrow, it is better to cut it through on both sides. Portions of lint are then interposed to prevent the sides of the wound uniting; and, after forty-eight or seventy-two hours, a rectum bougie is introduced by the patient daily, and kept in the part an hour or two. The hardening is absorbed; the complaint and all inconvenience often disappear.

Of Spasmodically contracted Sphincter.

1. One class of these cases is purely neuralgic. The patient has violent accessions of pain and spasm of the sphincter muscle. It is a sort of cramp. Like other cramps, it is best allayed by stretching the fibre. If there be spasm of the foot, the toe must be stretched by the hand. If there is spasm of one of the portions of the rectus abdominis, the body should be bent strongly backward, the fibre stretched and extended, and the pain and spasm disappear. So it is here; introduce a soft bougie, well

rounded and conical, into the anus, and distend it gradually, the pain and cramp will wear off.

The prevention of their return is another thing, and not so easily compassed; diet, air, and general rules; the correction of what can be found amiss in the patient's habits or bodily functions; his excesses perhaps, or his liver are to be attended to.

2. Another cause is hypertrophy of the sphincter, and its consequent abnormal action. The patient complains of having to exert considerable force to expel the fæces, and this has gradually brought on soreness and pain as attendants on the action of the bowels. On examining the rectum the cause of all this is discovered. The sphincter is large and proportionately powerful.

In one case this state of things was apparently produced by the habit of eating spiced dishes, and that on principle, under the idea, on the part of the patient, that this kind of diet would prevent his having piles.

There is a perfect resource in these cases, if everything else fails, namely, to divide the sphincter on each side, and let the wound unite slowly. Moderation in diet and a course of gentle aperients, may alone be sufficient. As long as the fæces are soft the patient is not annoyed by the size and power of the sphincter.

The preceding are infrequent forms of disease; the following is of daily occurrence :—

The symptoms are like those of the last cases, but more severe. The patient has pain and difficulty in passing the fæces. The pain and difficulty are in proportion to their solid character. A loose stool causes little annoyance. An ordinary solid motion, on the other hand, gives him intense anguish when he forces it from him. And the pain perhaps takes two or three hours to subside. Ladies often suffer from this complaint, and they are forced afterwards to recline on the sofa, with the hips bent, the knees drawn up towards the body, in order to bear with the pain. Then they learn to manage thus :—Every second or third night they take opening medicine, and this causes them to suffer much less with the loose evacuation ; and the intervening day or two, during which the bowels do not act, they pass in comfort.

Such are the symptoms of fissure of the rectum, as the disease is named by English writers. In its source and nature it is a small ulcer, situated at the inner or superior edge of the sphincter,—a shallow ulcer of the mucous membrane, which is exquisitely sore, and all the pain arises from the fæces being pressed against this sore part, and the seeming difficulty in voiding them lies in the instinctive shrinking from incurring acute pain.

The long diameter of the sore may be transverse, but from the corrugated state of the skin and mucous membrane at the anal aperture, the lesion resembles a fissure rather than an ulcer. This lesion is not unfrequently seated on the posterior aspect of the intestine, close to the anus : but it may be on either aspect. It occasionally occupies the skin as well as the mucous membrane at the verge of the anus, and its exact situation may be indicated by a small excrescence, like an atrophied external pile, about the size of a pea, at the base of which the fissure may be detected; or this excrescence is divided into two by a small cleft, and one extremity of the little ulcer may be detected at the bottom of this cleft.

The ulcer or fissure is quite superficial, and generally has no induration at its base or round it, so that it is liable to escape detection, but that the patient says, "Ah! there—that is the pain, and its seat." Then you begin to distinguish the less smooth, and slightly depressed surface of the superficial ulcer. Sometimes it is situated on the sphincter fibres, and by opening the part with a speculum, you may see it; but generally it is situated, just within, at the upper edge of the sphincter; its probable cause is costiveness. It has a mechanical origin. It proceeds from the frequent strain, and forcing of solid contents against the soft mucous membrane, so the term *fissure* is well chosen. It often is at first an actual rent of the tender membrane.

It is a fortunate thing that the most painful complaints are often the simplest and most easily cured. The present, most acute as it is, will occasionally get well rapidly, merely by the use, every other night, of some mild aperient, such as half a drachm of sulphur, or 5 or 10 grains of the compound rhubarb pill. If these means alone should fail, the use, in addition, of a mild mercurial ointment—which is to be passed into the rectum, so that it may lie and dissolve upon the ulcer—will often save the necessity of any further treatment.

Otherwise, the introduction of a straight probe-pointed bistoury on the finger, or better, a straight Cooper's hernia knife, and then bringing it to bear on the ulcer and making a nick in it, is sufficient at once to relieve the acute pain and cure the disease. A few drops of blood are lost; it is no operation. The patient goes about as usual, and gets well.

In very exceptional instances—in the worst and most obstinate cases alone—it is requisite to divide the sphincter entirely through on one side, implicating in the incision, if possible, the ulcer in the rectum. The sides of the wound are to be prevented, by interposing a piece of lint, from healing by adhesion. They close gradually by granulation. The ulcer then heals, and the patient loses all his pain.

A Peculiar Form of Internal Fistula.

Allied in some of its characters to fissure of the rectum, and in others to internal fistula, is an affection which has not hitherto received the attention which its importance demands. It consists of an ulceration of the mucous membrane of the rectum, situated generally an inch or an inch and a half within the bowel, accompanied by a sinus which generally leads down between the mucous membrane and the sphincter to near the external opening of the bowel. This affection is attended with the same kind of pain as that produced by fissure of the rectum. The pain, however, is not so severe, but it is apt to last much longer.

It is a disease which may not be recognised, even when the surgeon has an opportunity of making a careful examination. The finger introduced into the rectum may glide over the superficial ulceration, without detecting its existence, or a probe may be repeatedly passed over the opening without meeting the slightest obstruction. The way to detect it is as follows :—

Bend a probe to an acute angle, and introduce it upon the finger into the rectum. The patient may complain of pain at one particular spot. The point of the bent probe should then be drawn *down* over the tender spot, and if the mucous membrane be ulcerated in the way above described, the probe will pass between it and the fibres of the sphincter muscle, and its point may then be felt under the thin skin at the margin of the anus. Immediate relief is given in these cases by dividing the mucous membrane over the whole length of the sinus. This may be conveniently done by introducing a probe in the manner above mentioned, and cutting it out with a probe-pointed knife.

CASE.—A lady had for several years suffered very severe occasional pain at the lower part of the back and around the hips. This pain was most severe after passing a motion, or after using an injection, which she had often been directed to do under the idea that costiveness had to do with her sufferings. I saw this patient in consultation with Sir B. Brodie. The nature of the complaint was not upon that occasion ascertained, although a careful examination of the parts was made. After the lapse of a short time, another examination was made and the nature of the affection was then detected. The sinus was laid open from within, and the patient completely recovered.

It is hardly credible what an amount of suffering so trifling an ailment as that in the preceding and following case may produce. The disease, although sometimes very difficult of detection, may at other times be at once recognised by an educated finger.

CASE.—A lady had for six months suffered severe pain about the sacrum and hips. This pain was always increased after a motion of the bowels. She had undergone a variety of treatment, including the application of caustics, under the idea that she was affected with piles. Upon the introduction of the finger into the bowel, a circumscribed roughened spot was felt at the most tender part. The patient was placed under the influence of chloroform, and a speculum with an opening on one side was introduced. A probe, bent at an acute angle, was then passed into the speculum, and its point could be seen entering the internal fistula. Upon drawing the probe down, without using any force, its point projected under the thin skin on the margin of the bowel. The probe was cut out and the wound, after being once dressed, was allowed to heal of its own accord. The patient was permanently cured.

LECTURE XVI.

MALIGNANT DISEASES OF THE RECTUM.

Malignant diseases of the rectum assume two distinct forms, the diagnosis of which are, for the most part, easy, and to which in all their varieties, a considerable variety of treatment is available.

I. In the first of these, the rectum is the seat of a morbid growth, which, whatever be its primary seat, has a tendency to invade every tissue, substituting for all a uniform mass of disease. The commonest form is the encephaloid, and this occasionally, here as elsewhere, is black with melanotic deposit. The scirrhous stands next in frequency, and it is only very rarely that the tumour consists of the alveolar or colloid variety of cancer. The growth commonly originates from two to five inches within the anus; its centre being mostly within three to four inches of it. It invades, in a very short time, the whole circumference of the intestine, which becomes a tube of cancerous material from two or three, to five or six inches in length.

The complaint, though it may occur at any period of life, from boyhood upwards, is not often met with in patients under thirty years of age.

The cylinder of cancerous growth, thus substituted for a certain length of the natural structure of the rectum, is externally of a firmer, denser consistence. The inner portion, that looking to the cavity of the intestine, is in either case, whether the mass be encephaloid or gelatiniform, of a looser texture, readily broken down upon pressure, soft and spongy. The volume of the tumour is in this soft inner stratum, and it appears to be due to the development of the disease in the mucous and submucous tissues. Sometimes the growth is irregular ; or a long shoot, like a bell rope with a festooned end, escapes from the anus with every stool. After a time, the inner surface ulcerates, so that its margins become more elevated than the centre, by reason of the combination of a disintegrative and ulcerative action with one of progressive growth. The commencement of the complaint is very insidious. It has happened perhaps that the patient has suffered for years from costive and irregular bowels, from a sense of irritation in the rectum, and he may have been carefully examined by surgeons, and no disease detected. Often, on the other hand, the disease has made considerable progress before it has been even suspected.

It is easy to deduce the symptoms of the disease, from the history which has been given of its nature. The canal of the rectum has been gradually encroached upon and obstructed. Then, the fæces have been expelled with difficulty when solid; at length, in that state they have been retained, and have only come away through the action of medicine or increased secretion dependent upon irritation, in serous solution or in fragments combined with mucus. The occurrence of more or less constant discharges of this kind may closely resemble the symptoms of diarrhæa; but the character of the discharges and the concomitant symptoms will indicate their true nature.

At length there is a frequent call to empty the bowels, always with an imperfect relief—small fragmentary quantities only passing, leaving tenesmus afterwards. Then, arising conjointly from the narrowing of the passage and the growth of formidable disease, there is experienced a sense of weight—sometimes making it difficult to rise from a chair—in the rectum, aching round the hips, pains of the thighs, and irritation of the bladder. The soft surface of the tumour, slightly torn perhaps by the passage of fæces, bleeds continually; blood and mucus are constantly, pus more obscurely, mixed with the discharges from the bowel.

Now, it by no means follows that a person who has these symptoms labours under cancer of the rectum; stricture or even piles will produce them. The patient's look, however—the complexion, the facial expression, and the marks of a progressive emaciation—generally tells you beforehand how grave his case is. But a diagnosis can only be made through surgical examination of the part. The finger introduced into the rectum, can feel whether or not there exists a growth in it such as has been described. As in everything else, there is room here for tact and experience. Yet a very little experience suffices, in cases that are at all advanced—the change from the natural condition of things is soon so clearly marked.

It is not so, however, in all cases at an early stage. The distinguishing of a cancerous narrowing of the gut from chronic inflammatory stricture may not then be so easy. The disease may, however, be generally recognised by its history, the severe character and the extensive seat of the pain, the patient's aspect, the detection by the finger of an irregularly indurated structure, and by the cartilaginous, or the soft elastic consistence of the morbid growth, which leaves perhaps a bloody stain upon the examining finger.

These unfortunate cases are almost uniformly progressive; they necessarily get worse and end fatally. But they admit of considerable mitigation. The patient may be spared much suffering. The following means are in their turn available:—

The occasional use of a soft rectum bougie (of half an inch in diameter or less), to press aside or repress the tumour, and shape a passage through it. This is often a temporary source of relief to the patient; but then he must have first been suffering from obstruction, and the means must be only occasionally resorted to, or it produces its own direct irritation. Great gentleness must be used also in its introduction, or laceration of the softened coats may take place. The bougie is to be retained on the tumour from a minute to a quarter of an hour, as experience may teach.

Injections of tepid water, which often soothe but occasionally distress the patient, are among the things to be tried with caution. If the water passes easily through the narrowing, it is particularly soothing to the intestine above, and helps to relieve it by bringing away fæces in fragments or in a softened state. Aperients are commonly necessary from the want of natural relief of the bowels, and from the aggravated distress the patient feels from accumulation in the colon. Small doses of castor oil or rhubarb, 5 to 10 grains of the compound rhubarb pill, and the like answer very well. The mildest aperient is the best. Almost everyone has had experience in himself how drastic purgatives heat and disturb the rectum. They do so, of course, in a tenfold degree in cases of disease of the bowel. In combination, or rather alternation, with the above-named means opiates are of sovereign importance. An injection of a drachm of laudanum in two ounces of solution of starch, or the introduction of a two-grain opium suppository, may be very useful; yet, in general, it is better not to trust to their local use, but to administer the narcotic in an opiate draught, or by subcutaneous injection. How often this opiate should be given, whether twice in the twenty-four hours, or every night, or every other night—the aperient being given on alternate nights — or every third morning, the opium being taken every night;—all these things are minutiæ—minutiæ in a book—minutiæ in general,—not minutiæ, however, by any means to the suffering patient,—and observation alone of the individual case will enable the surgeon to suit and adapt his practice to the requirements of each.

The question naturally arises in these cases: can nothing be done to divert the channel of the fæces to another and healthy locality? The answer to this is affirmative; but then, the case manifestly must not have advanced to the last stage of the disease, and the chief cause of the pain must be clearly traced to the obstructive nature of the disease, and to the great local suffering produced by the flow of fæcal matter over the diseased parts. We may then seek to palliate the patient's sufferings, or if he desires it, we may, in cases of extreme obstruction, purchase him a respite from suffering and death, by opening the bowel in the left loin.

II. Under the second head of malignant disease of the rectum, a disease sometimes presents itself, as destructive as the above described, but in which there is no prominent or obvious morbid growth.

A few words give its whole features. The mucous membrane disappears by ulceration; the subjacent tissues of the bowel are indurated, very slightly thickened. This state may occupy, and often does occupy, the same region as malignant growth; but it may extend along the intestine, to as much as 14 or 15 inches, penetrating far into the sigmoid flexure of the colon. It comparatively rarely spreads to the anus. This is equally the case with malignant growths; both generally stop two inches short of it.

This disease can be identified only at the last. The finger passed into the rectum, feels the length of bare, contracted, and hardened tissue, that now forms the cylinder of diseased intestine. The treatment of this form of the complaint is exactly the same as that given for malignant growth.

But there exists an important variety of this disease; the indurated ulcer occasionally commences at the verge of the anus; and if it is unchecked, spreads round the whole circumference, and extends gradually into the intestine, and ends in the same manner as that commencing inwardly.

The nature of the disease is easily verified, for it is not only felt but seen; the ulcer is apparent, and its hard, but not much thickened base, may be felt.

The complaint is of slow progress, but it is desirable to treat it actively, and to get rid of it at once, when met with in an early stage. Like cancer of the lip, this may sometimes be done easily at its commencement; when it is large and well established it is fatal. The only available mode of treatment is the destruction of the ulcer. For this purpose, if it is of small extent, on one side of the anus, nitric acid, potassa fusa, and the like may be used. But the knife is preferable: clean excision of the indurated part is surer, and upon the whole less painful. By the operation of passing two tenacula through the small portion intended to be removed, and widely dissecting them out, the entire removal of the matrix of disease is secured.

It is for the patient's interest that the surgeon should be bold in this complaint; and even when it has invaded the whole circumference of the anus externally, and spread to an inch or an inch and a half of the interior of the rectum, its edge being quite defined, and all above being soft and clear of disease, and the patient of an unbroken constitution, not passed middle life, or not beyond 50, the complete removal of the disease by an operation should certainly be attempted. If left, a fatal result only can be expected.

These cases are much more common in women than men. There was in January, 1866, under my care in St. George's Hospital, a very well marked instance of this disease. A young woman, seven months gone in the family way, was admitted, suffering almost continual and most excruciating pain in the lower part of the rectum. Upon examination the whole circle of the mucous membrane was found to be ulcerated, and portions of the remaining tissue were thrown up into slight elevations by the spasmodic action of the sphincter muscle. At first sight the parts presented the appearance produced by warts growing from the anus; but a closer inspection proved that the inequality of surface was produced, not by any additional growth, but by the unequal ulceration which had ensued in the slightly thickened parts. Ulcerated fissures existed round the whole circumference of the bowel, and the pain which the patient suffered was in proportion. She was delivered a few days after her admission, which prevented any operation being at that time performed.

LECTURE XVII.

OF SOME RESTORATIVE OPERATIONS CONNECTED WITH THE RECTUM.

THE most interesting field of surgery is that in which its means are immediately directed to repair lesions or deformities unconnected with disease, and where they are resorted to for correcting, in a frame otherwise sound, some mechanical imperfection.

The cases of this kind which present themselves in connection with the rectum are of great gravity, implicating the comfort or existence even of the patient. They belong to two heads.

Under the first, we may include laceration of the sphincter in labour; and a fistulous communication between the rectum and vagina, constituting recto-vaginal fistula, a condition which also generally takes its origin from some injury, abscess, or sloughing of the parts after tedious parturition.

Under the second head are included congenital deficiencies of the terminal part of the rectum.

Whenever a labour proceeds rapidly, the perinæum is in danger of being torn. Sometimes the laceration is superficial, and involves a few fibres only of the sphincter with the integument. Sometimes the muscle is entirely torn through. The insignificance or gravity of the case turns upon this difference, for if the principal part of the sphincter remain entire, the laceration, however it may heal, leaves no unpleasant consequences, as far as the function of the rectum is concerned. Nevertheless, even this lesion should not be neglected, because any tendency to prolapsus of the pelvic viscera is liable to be greatly aggravated by the loss of the natural support of the perinæum, and prolapsus may ensue when the patient has recovered from her confinement. If the laceration, however, be of limited extent, we have only to maintain the knees together by a bandage, and keep the parts clean, by washing them four or five times a day in tepid water, to secure union. If the rent be greater than this, it is desirable to close it as soon as possible after delivery by sutures, and if this cannot then be done, we must defer any operation until the lochial discharges have ceased.

But when the sphincter is completely divided as the effect of the laceration, the natural result is that the edges of the wound cicatrise *without uniting;* the office of the sphincter ani is at an end; there is nothing to prevent the fæces from escaping, as soon as they reach the lower part of the rectum; and finally, the sphincter ani, being diseased, wastes, becomes atrophied, and in a great measure disappears.

The case is occasionally presented to the surgeon in either of the above conditions, with the laceration still presenting a raw surface, or after some lapse of time, as a cicatrised tear with a wasted sphincter.

Under very favourable circumstances, that is to say, where the parts are extremely relaxed and continue so for some days after the labour, where great attention is paid to cleanliness, &c., where the bowels are in a soluble state, and the patient is kept perfectly still with the knees bound together, union of a laceration even through all the fibres of the sphincter may take place. But the chances are always against this favourable result, and it is prudent to have recourse to an operation to remedy the mischief.

Two procedures used to be adopted in these cases, the one originating with Mr. Copeland, and the other with M. Dieffenbach. The object of the first was to remove the tension, and allow the edges of the laceration to come into that close apposition necessary to their union. This was accomplished by dividing the sphincter muscle deeply on each side, and preventing the union of these wounds, while the attention was directed to the healing of the original laceration. M. Dieffenbach's plan combines these lateral sections of the sphincter with the simultaneous sewing up of the laceration by means of four or six uninterrupted sutures. The success which attended these plans of operation was never very promising, and they have been superseded of late years by another method, which has proved eminently successful in practice. There is much nicety required in the operation ; but then it is altogether preferable. For the extent of the incision no exact rule can be laid down. Foresight and skill in planning, with tact and dexterity on the part of the surgeon to avail himself of the exact circumstances of the case, are no doubt required, but the principles are clear and simple.

The method of operating will be essentially the same, whether the sphincter ani has been torn across or not, and it makes no difference as regards the closure of the wound, which will take place as easily where the sphincter is involved as where it remains intact.

The operation consists in denuding the mucous membrane of the vagina and the edges of the laceration applying *some* metallic ligatures deeply, on the principle of the quill suture, and *others* superficially, in order to bring the parts fairly and firmly together. In all cases it is necessary to perform this denuding process extensively and deeply, so as to get the support of a good thick cushion, and we must pay great attention to the angles of the wound, particularly the lower one at the orifice of the bowel. As rather smart hæmorrhage may be anticipated, it is well to have a good supply of ice at hand. Chloroform having been given, the patient is to be placed in the lithotomy position, or to lie half over on her face. The vagina is to be kept well open by means of the duck-billed speculum. The mucous membrane about the opening of this canal is to be dissected upwards for a good extent, and the skin about the edges of the laceration is to be dissected off for about an inch and a-half forwards, and obliquely backwards on each side, so that the denuded surfaces may become continuous at the posterior angle of the laceration. Three or four sutures of stout silver wire are then to be passed deeply through the denuded surfaces, so as to bring them firmly together, the sutures nearest the rectum passing the deepest. The edges of the flap of mucous membrane are next to be trimmed, and it is then brought down to the upper angle of the wound, and united by silver wire sutures to this part, so that it may cover in and slope over the deep surface of the denuded parts as the wound heals. The deep sutures may be tied over a piece of quill, or a bougie on each side of the wound; or two bars composed of pieces of ivory or metal, and perforated with holes, may be used, the ligatures being passed through the holes and properly secured; the superficial parts of the wound may be united by three or four sutures of thin silver wire.

Mr. Thomas Bryant has invented an instrument with a small, sharp-curved prong at its extremity, by means of which the mucous membrane may be raised from the subjacent tissues to the exact extent that may be requisite. By cutting on the convex side of the prong, the raised mucous membrane and nothing more is removed. The prong may terminate in one, two, or three sharp points, which may be directed so as to take up the mucous membrane either in the vertical or in the transverse direction. The use of such an instrument very materially facilitates the operation.

If the laceration of the perinæum is complete and extends any distance into the bowel, it is necessary to divide the sphincter freely, at least on one side. If any vessel "spurt" during the operation, it ought to be secured at once, and the wound should not be closed until the bleeding has materially diminished. As hæmorrhage is apt to recur, it is well to insert a piece of ice in the vagina, and keep an ice bladder in contact with the parts.

The deep sutures and bars should not be removed for four or five days, and the superficial ones should remain six or eight days. The bowels must be kept confined with opium, and the urine removed by a catheter being retained in the bladder, or passed at regularly stated intervals. The patient must remain in bed for three weeks, and even longer where prolapsus has formed a feature in the case.

By this operation we may almost always afford the patient perfect control over the bowel, so that the inability to retain the fæces is overcome; but we cannot always prevent her suffering from prolapsus, because in many cases, this condition arises from other causes than loss of perinæal support. The most effectual way of guarding against it, however, is to make the new perinæum as thick as possible, and to plan our incisions so as to contract the orifice of the vagina.

There are probably no operations more than the present which require that the surgeon should have the clearest conception of all that he contemplates doing before their commencement. When the different sections that have been described have been all made, and he has to commence the insertion of his sutures, the parts are hardly recognisable; and surgeons sometimes end these operations very imperfectly, and evidently in a totally different manner to that which had been originally intended. This operation, in fact, as it contributes more than any other in the compass of surgery to the comfort of the patient, when it is successful, so is it in every sense one of the most delicate and difficult.

Nor is the battle won, unluckily, when we have got as far as the successful mechanical termination of the operation. The parts may have been admirably adjusted and secured, but it still remains to be seen whether they will unite. And it requires only the event of an ordinary motion to ruin all the foregone care and labour.

It is desirable, therefore, to make a preliminary trial with the patient, to see how this matter can be carried through. A week should be given to this experiment; at the commencement of which the bowels should be fully and largely emptied by a given purgative dose, and immediately a strict course of rest and diet observed; the patient taking daily a very small quantity of digestible, and highly nutritive food––arrowroot for breakfast and supper, soup and jelly with a biscuit for dinner, and drinking very little. With this plan the administration of opium may be combined, so as thoroughly to lock up the bowels. This state of things may be maintained for a week, and then a gentle aperient should be given, and its operation studied, to make it evident whether the use of an injection might be further required to relieve the rectum of its contents without any straining, or the passage of any hard mass.

This experiment having been successfully made, the patient should again get about, take plenty of her customary diet, with exercise and air, and bring herself into her full condition of strength, vigour, and spirits. When this is accomplished the operation should be performed.

Recto-vaginal fistula commonly ensues, as has been said, from some injury or sloughing of the soft parts after a protracted labour; sometimes, though rarely, from other causes, such as stricture of the rectum, abscess in the recto-vaginal septum, and so on. The form and extent of the lesion may vary very much; from a small round, oval, or oblong opening to a complete loss of the septum, and a perfect communication between the contiguous canals of the vagina and rectum, from the anus to the os uteri.

The amount of success attending surgical attempts at curing this distressing affection used to be very small and unpromising; but it is so no longer. The results obtained from recently devised measures have been so good, that we may regard the operative treatment of both recto-vesical and vesico-vaginal fistulæ as among the most satisfactory proceedings in surgery.

The greatest ingenuity has been exercised in the way of instruments, and there are a variety of needles for passing the sutures and bars, metallic buttons, and little wire splints for fixing them. The most ingenious of these buttons are, perhaps, some little metal cones with a hole in the centre, and a slit on one side, invented by Mr. Pollock. The main thing, however, is to see that the edges are properly "freshened" and denuded, and accurately brought together by sutures.

The principal points to be attended to are—

1st. To get the patient into a satisfactory state of health, into such a condition as will promote a healthy and vigorous process of union, and to ensure a right state of the secretions.

2ndly. Chloroform should be given to prevent the pain, and allow of a clear view of the parts involved during all the details of the operation.

3rdly. The most careful denudation of the edges of the fistula should be made, so that not the least portion of mucous membrane be left at these parts when the edges are brought together.

4thly. Needles with handles should be used to insert the ligatures, and these last should be metallic.

5thly. Careful attention to the bladder and rectum is necessary afterwards, to prevent the urine from coming in contact with the wound on the one hand, and to avoid any strain on stitches or wound by the action of the bowels on the other.

I prefer Mr. Startin's tubular needles, and the silver wire for the purposes of this operation, which may be performed in the following way :—

The bowels are to be well cleared out by enema, and chloroform given. The patient may kneel and lean forward, so that the chest is lower than the abdomen, or she may lie upon the left side with the knees well drawn up, or as in the operation for lithotomy. If she occupies the first position, and the belly is relaxed and pendulous from previous confinements, the air will rush into the dilated vagina as the abdominal viscera fall downwards, and a good view of the canal will be obtained. The parts are to be well exposed. This is done by an assistant maintaining the nates widely apart, while a duck-bill speculum is inserted into the vagina. The opening of the fistula is then to be well drawn down by hooks, or by means of a flexible metal sound, hooked through the fistula from the rectum by bending its end forwards. The edges are then to be most carefully pared to their whole extent, making the section with a small and thin knife, obliquely from the vagina towards the gut, in such a way that the wound is bevelled at the expense of the vaginal mucous membrane, great care being taken to avoid the lining membrane of the rectum. The sutures are next to be inserted, by piercing the parts obliquely rather more than a third of an inch outside the incised edges of the wound. The ligatures are then to be tightened and twisted in such a way as accurately to appose the raw edges, without the least interposition of the mucous membrane in the line of the wound by its folding over or inversion, and without inducing any undue tension. If the fistula extend very close to the anus the degree of tension may be considerable at this part, and it is then necessary to make a section of the sphincter, but not otherwise. The bowels must be confined for ten or twelve days after the operation, and the urine removed by the retention of a catheter in the bladder, or by its insertion at regular intervals of six hours. The parts must be maintained in perfect rest and cleanliness, the latter being procured, by means of injections of tepid water into the vagina.

The operation described resembles that which has lately been performed with so much success in cases of vesico-vaginal fistula. If the septum between the rectum and vagina be thin, it is well to remove a portion of the mucous membrane only from around the orifice in the vagina without interfering with the edges. The raw surfaces of the mucous membrane may then be brought into apposition with the sutures, passing from the healthy mucous membrane outside that which has been removed, to near the margin of the fistulous opening. For removing the mucous membrane in this way, the prongs invented by Mr. Bryant afford great assistance.

Whenever the mucous membrane is abraded in a healthy constitution, it has a natural tendency to contract, like the skin on the surface of the body, and advantage may sometimes be taken of this tendency to procure the closure of a fistulous opening. The repeated application of caustic will sometimes cause a fistula to heal, and after an operation such as that above described should any small sinus be left, it may frequently be closed by this means. Mechanical laceration of the mucous membrane will sometimes be followed by this process of contraction.

Case.—A lady was confined of her first child in the country, in 1864. The labour was protracted, and the surgeon felt called upon to use instruments. Chloroform was at the same time administered, under which the patient became excited. Having no assistance, it was impossible to prevent the patient moving about in a violent manner. The result was a recto-vaginal fistula, situated above the sphincter ani, which subsequently showed no disposition to heal. The patient now came under my care, and the operation last described was performed, and when the patient recovered, all inconvenience with regard to the communication between the rectum and vagina appeared to be at an end. Upon examination, however, a small oblique fistula was still found to exist. A probe passed obliquely upward from the rectum into the vagina, but from the valvular nature of the opening no inconvenience was experienced, and no further operation was contemplated.

This lady became pregnant again in 1865, and when she was confined, great care was taken that no fresh laceration should take place. It was found, however, that the mucous membrane around the original fistula had become lacerated to a slight extent in different directions. The surface so exposed became covered by a mass of healthy granulations, the size of a small two shilling piece. These gradually contracted, and firmly and permanently closed the opening.

The *second class* of cases for which restorative operations in connection with the rectum are required, comprehends a vast variety of congenital malformations, some of which admit of complete reparation, others of relief, while some are utterly hopeless. The slightest forms of these cases may be a mere occlusion of the anal aperture by the integument only: or an incompleteness of the anus, when, in place of the regular structure and opening, there is a small aperture like the opening of a fistula, on one side perhaps of the median line, while there may be a small cul-de-sac, big enough to hold a millet seed, in the exact axis of the deficient anus ; or the single small opening may be in the same situation.

In the first mentioned instance the meconium collects, and forms a swelling in the perinæum, corresponding to what should have been the aperture of the anus ; a darkened hue or colour is given to the tumour by the contents of the gut, and the case is simple enough. A sharp-pointed bistoury is to be plunged into the centre of the protruding skin, and a small transverse incision should be made ; then, another little incision, at right angles with this, and the four angular flaps of skin should be excised. A bougie is passed daily, to maintain patency of the aperture during the healing process, and the cure is easily effected.

In the other cases, the true state of things is sometimes overlooked at the birth of the infant, and for a few weeks, as long as the fæces are nearly liquid, nothing may occur to draw attention to it. In time there is swelling of the abdomen, distress, obstruction of the bowels, often accompanied with straining, and frequent expulsion of small quantities of liquid matter, and then the truth is suspected, and the parts examined. This case also admits of a complete remedy ; the imperfect opening is to be enlarged by the introduction of a straight probe-pointed bistoury, carried, if the opening is not in the proper place of the anus, in a direction towards that part ; if it be exactly situated there, then carried a quarter of an inch forwards, and a quarter of an inch backwards, so that the end of a small rectum-bougie may be admitted.

It is on no account desirable at this time to make the opening large: it should be free enough to give exit to the consistent pulp, or putty-like material with which the bowel may now be loaded, but not larger; for it is impossible to tell how much of the natural sphincter apparatus may be there, and it is all important to preserve what there may be of it. A larger opening by the bistoury might get beyond its confines, dividing the few vestigial fibres present. The surgeon is to act on the principle of preserving every bit of this structure which may happen to have been formed.

The small but sufficient opening, obtained in the manner described, is to be maintained by the daily introduction of the bougie, an inch into the rectum; this may be kept there an hour. And for this purpose, it is best to use a small stump of a polished, rounded, metal cylinder attached to a broader disc, which will rest on the perinæum, and may be secured there with ties.

The use of such an instrument serves further to stimulate and excite to growth any rudimentary sphincter fibres, which it stretches and extends. Gradually, a larger and larger instrument may be substituted as the child grows. Perhaps, when it is weaned, enlargement with the bistoury may be necessary to allow the passage of more solid fæces. By such management these cases end prosperously; the natural sphincter structure, apparently, being often thus educed, as it were, from the rudimentary state and becoming perfectly efficient.

The next in importance, is when the rectum is complete to within an inch of the anus, terminating within that distance of the sphincter in a cul-de-sac. The origin of these deviations from the normal state—the congenital imperfections of the anus and rectum—possesses interesting physiological as well as pathological considerations. They depend upon one of two causes : — 1. Arrested development. For instance, the bowel is not from the first one continuous tube, but the anal portion is developed separately from the upper part, and, as the two unite, the continuity of the passage is effected by the absorption of the septum. Again, the cloaca which naturally exists at one period of fœtal life, where the rectum is in contact with the vagina or urethra, may become the seat of a communication between these parts. 2. On the other hand, it occasionally happens that a part of the rectum above the anus becomes obliterated by some intra-uterine disease, and we may then have an external anal pouch, an areolo-fibrous cord, and again the bowel in its normal state.

Let us take the first case, the rectum terminating about an inch from the anus. Then there may or may not be a superficial cul-de-sac of the integument, the end of which, if it exist, may abut upon the end of the intestinal cul-de-sac, so that only a thin partition, after all, exists between the cavity of the intestine and the surface of the body. When this is the case, it is obvious that a very simple proceeding alone will suffice : the septum is to be perforated with a middle-sized trochar in the axis of the cutaneous cul-de-sac.

Should the cul-de-sac extend to any depth at all, there may be a slight interval between the anal and the upper portion of the gut, occupied by the septum and a little intervening areolar tissue. Something more than puncture is then required. Having determined the close proximity of the upper part of the bowel, and made a free opening into it for the exit of the retained fæces, we must seize the mucous coat of the bowel, draw it downwards, and tack it to the edges of the wound in the skin by means of silver wire ligatures.

The other case is, however, the more frequent; the plane perinæum is no indication whatever of the deficient intestine. In this case, the first rule is, not to be in a hurry to do anything. It will be several days before the meconium and other contents of the intestine accumulate to a degree to be troublesome. The infant does not suffer by the delay, and there will be this gain :—the operation, which you perform in the end, will be one of *relief*, and all such operations do best; that is to say, those in which the wound and its attendant irritation are made up for by immediate functional restoration or relief of suffering.

But it is not possible to tell, except by the event, that the case is so simple and straightforward as we are supposing it really to be. For all the accoucheur can observe or determine is this, *there is a plane perinæum with nothing to be felt of intestine above or behind the integument.* It is impossible, therefore, to say how far from the perinæum the terminal cul-de-sac of the intestine may be. Wait, then, for events which may throw light upon the matter. Wait till the rectum becomes distended with contents, which will happen in a few days' time, and then you may very possibly feel with distinctness an ill-defined, soft fulness when you press with the finger on the perinæum, that was not at first distinguishable. The cul-de-sac has become filled, extended probably, pushed downwards, and brought nearer to the point, from which you may hope successfully to open it.

The matter, indeed, is settled as soon as you distinctly feel, when the child strains, or vomits perhaps, the obtuse, obscure forcing of the full cul-de-sac downwards against the finger. You have to calculate, as exactly as possible, where the axis of the intestine should reach the perinæum, and then introduce a middling-sized trochar directly into the gut. The child of course receives instantaneous relief. The canula is left in the perforated wound you have made, or taken out only to be cleaned, and the passage gained is then preserved by dilatation, or by cutting even, if required. It may afterwards be enlarged if necessary; but this will hardly be requisite. The canal artificially made will be ready enough to grow with the rest of the frame, and it is only necessary to have a series of canulas, or more properly, a set of metal plugs; for, in a short time, the inner surface of the tube that was made by the trochar cicatrizes, and forms a channel through which the fæces naturally pass.

It will readily enlarge with the child's growth, if the proper means to encourage it be not neglected; that is to say, if the metal cylinder or plug be worn constantly, and if, from time to time, one a shade larger be brought into use. There are necessary conditions. For if on the one hand, there are almost unlimited sources of accommodation in the growing body, which may by proper means be turned to proper account, yet, on the other there is an inherent tendency in all cicatrized wounds and cicatrices to contract and draw together ; so that left to itself, such a channel as we have supposed, after it has once been ever so fairly healed and established, will nevertheless, very rapidly narrow to a small, hard fistulous canal, through which nothing but liquid can pass, and the restoration of which is a work of great trouble and difficulty.

Therefore the metal plug has always to be worn. It is only to be taken out to be cleaned, or to allow of the action of the bowels. The pewter-like metal, of which flexible metal bougies are made, is better for this purpose than silver. It is less hard and harsh. Its surface has a sort of greasiness, and its substance is yielding in a degree. It should rest, of course, upon a good broad base, fitted to the perinæum. The surface should be polished, so as to be very smooth, a crack in it making a sort of hardly perceptible edge, will be felt, and cause irritation. But if the instrument be well made, of the proper diameter and length—for an adult at least two inches in length, and half an inch in diameter, and terminating in an extremely evenly rounded end—it will answer the purpose of preserving a sufficient passage for the contents of the bowel, and, being constantly worn, will never be felt as a great inconvenience. The patient may walk, ride, and take exercise as prolonged and violent as any one else. He is in comparative comfort so long as his bowels are not irritated and loose; but then he has to be on his guard. But all the requisite self-observation will have grown up with him, and he is, with his alleviated ailment, quite as independent a person, practically, or nearly so, as the most perfectly constituted being.

When in an infant with imperforate anus, nothing like a permanent cul-de-sac of intestine is to be felt in a week or ten days—distress and obstruction supervening, distention, vomiting, emaciation,—the surgeon may still attempt something. Then he had better make an opening in the integument of the perinæum, and introduce the point of his little finger, to try and feel for something like the end of the intestine within, and puncture it. If the pelvis be not small and contracted, and the perinæum becomes convex when the infant screams, success may be anticipated; if the opposite condition exists, failure will probably attend any operation. When such attempts are made, though unsuccessfully, it is wonderful how long the infants survive; three weeks or a month are often gone through ere they perish. Failing to reach the bowel by the perinæum, there only remains one plan open to us, viz., to establish a vent through the colon, by the operation in the loin which has been already described.

There are some rare complications, such as imperforate anus, with the rectum communicating with the vagina, the treatment of which is to be accommodated to the circumstances of the case, and is obviously deducible from the principles which have been now laid down.

In these cases I should feel inclined to proceed in the following manner. First, to seek the point of communication between the gut and the vagina or urethra ; then if practicable, to pass some sound by the latter canals into the bowel by the aperture of communication, so as to make it project in the perinæum. Taking the sound as a guide, an incision should then be made from the point selected for the site of the anus to the sound, the end of the bowel sought for, opened freely, the mucous coat drawn downwards, and connected with the edges of the wound in the perinæum by metallic ligatures. Care must be taken, of course, to carry the new tract as far away from the old one as possible, by keeping the incisions well towards the coccyx. When the rectum communicates with the vagina, this plan is a perfectly practicable one ; but it is not so, when the fæces escape by the urethra, nor can the opening in this canal be closed afterwards. The new and artificial tract must be kept perfectly patent, and its contraction prevented by the insertion of metallic bougies. As soon as this has been accomplished, the closure of the entrance into the vagina must be attempted by the actual cautery, or, what is better, by a plastic operation.

LECTURE XVIII.

ON LONG-CONTINUED PAIN IN BONE—FROM ABSCESS—FROM CONDENSATION—FROM CONSTITUTIONAL CAUSES.

IN the present lecture I propose to bring together some remarkable cases of long-continued pain in bone, dependent upon very different causes, and relieved by very different means. The juxta-position of these cases will at once show their essential points of dissimilarity, and the reason for the various modes of treatment which were adopted.

As observed in practice, you must not expect to find the cases so well marked as some of those which I am about to describe. They will, on the contrary, present themselves with numerous complications and, in constitutions predisposed to them, with a number of affections which will, more or less, modify and perhaps mark the local symptoms. The cases which I shall relate will, however, be typical of certain classes of these diseases, and will, I think, enable you to refer some of the cases which you will observe, to their proper causes.

CASE I. *Chronic Abscess in Tibia.*—James Stocker, æt. 26, came under my care on the 16th

June, 1851. He then complained of intense pain in the left leg, which had prevented him sleeping, except at very short intervals, for a month previously. The pain continued without intermission, but was aggravated by occasional paroxysms. At such times, it would first be felt in the tibia, extend thence to the knee, and shoot up the thigh to the hip. This shooting pain was of a most excruciating character.

Upon examination, the shaft of the tibia was found enlarged to double its natural size. The enlargement occupied four or five inches of the bone, being most marked in its middle third, but altogether situated nearer the upper than the lower extremity. Pressure upon the swelling caused no uneasiness, nor did the position of the limb in any way appear to affect the character of the pain. No tender point could be detected in any part of the enlargement. When the pain was most severe, he appeared to derive some comfort from walking about; and he would occasionally get up in the night to do so. The pain and want of sleep had evidently given him a careworn appearance: but as far as the different functions were concerned, he appeared to be in perfect health; nor was there any history of his having suffered from constitutional disease.

He stated that, seven years and a half previously, he had, after some slight injury, first experienced pain in the leg. It was then worst at night, but used to leave him at five o'clock in the morning, "as regular as the clock struck." At that time, the pain lasted for nine weeks, and during the whole period was unaccompanied by any tenderness upon pressure.

At different intervals afterwards, he experienced some slight return of the pain, but never so as to cause him much inconvenience, till he struck his shin against a chair, about five weeks before he came to the hospital. On the evening after this slight accident, he felt pain in the leg, which he at once recognised as of the same character as that which he had experienced seven years before. In two or three days the pain became so severe that it prevented him sleeping at night.

A blister was now placed over the tibia, and was dressed with equal parts of mercurial ointment and extract of hyoscyamus. He was also directed to take four grains of the iodide of potassium in infusion of quassia three times a-day. This treatment was continued for a fortnight, when the pain had in a great measure subsided. He now took more to drink than he was accustomed to do, and the pain returned with all its former severity. It was, however, still unaccompanied by fever, or by any tenderness of the part. The same plan of treatment as before was adopted, and he experienced a remission from his sufferings for about a week. At the expiration of this time, without any apparent cause, the pain again returned, and a repetition of the medicine was not followed, as before, by any marked relief. I now determined to trephine the tibia, and the operation was performed on the following day. As there was no spot upon the tibia that was particularly tender, a point was selected for the application of the trephine which projected, and which felt slightly hotter to the touch than the rest. A common trephine, with a shoulder, was used, as no other was at hand. The instrument in consequence became buried in the bone, as far as it could conveniently go, before it reached the medullary canal. This depended upon the great thickness and increased hardness of the parts, and caused a little delay in the operation. After removing the trephine and reapplying it, some matter was observed oozing up by its side. A complete circle of bone, three-eighths of an inch in depth, was now removed, and an abscess in the medullary canal presented itself. The cavity in which it was contained was about an inch and a half in length, and would have held two or three drachms. There was no portion of dead bone connected with the disease, and the matter was quite white and not in any degree putrid. The point at which the trephine was applied was exactly six inches from the head of the tibia.

After the operation, the edges of the wound were slightly brought together and covered with wet lint. The pain ceased as soon as the patient had recovered the immediate effects of the operation, and did not again return. On the 22nd of August, the skin had nearly covered the wound, leaving a small opening leading into the cavity of the bone. The tibia itself had by this time considerably diminished in size.

CASE II. *Strumous Disease of Tibia.*—A gentleman, of a highly nervous temperament, had, twelve years before, taken large quantities of mercury for some affection of his throat, which there was no reason to believe was of a specific character. His mouth was kept sore by the medicine for five months, during which time he continued taking it, and, according to his own account, he occasionally took as much as twenty-five grains of blue pill a-day. Six years after this, he had the small-pox, which left him much debilitated.

In the year 1849, he became subject to a very severe cough, which there was reason to believe was connected with a cavity in one of his lungs. His ankles became swollen during the following year, and a pain settled in his left shin. About a fortnight after the first appearance of the pain, he struck his leg severely. The pain then became suddenly increased, and continued without intermission for many weeks. After this he went to Bath, and the symptoms ceased for about three months, but again returned, in consequence, as he supposed, of a very long walk.

In the spring of 1851, the leg was struck a second time, and the pain became of a much more severe character than it had previously been. His cough was now much relieved, and at length entirely left him, while under the care of Dr. Golding Bird.

Three months after his second accident, he became subject to rheumatism, which constantly recurred, and was situated in different parts, but principally affected the lower part of the right thigh. The rheumatism first appeared after the pain in the leg had been temporarily relieved by taking iodide of potassium, in doses of four grains twice a-day.

From the period of the second accident, in the spring of the year 1851, to the time when I first saw him in 1852, the pain in the leg was of a very distressing nature, but was rather better when he walked upon it during the day than at other times. This circumstance is the more remarkable from having been before observed in somewhat similar cases. At night, the pain usually deprived him of rest till between six and eight o'clock in the morning, when the limb generally became bathed in perspiration. After this he would fall asleep. His sufferings were always relieved by the iodide of potassium, which had originally been prescribed for him by Dr. Golding Bird. He usually experienced the benefit of this medicine after he had taken five or six doses in the way above mentioned. While taking this remedy he slept very well; but as soon as its influence had ceased, the pain habitually returned with all its former severity. He was therefore driven to have constant recourse to it, and, on an average, took about eighty grains a month. He found, however, that although the pain was relieved by this means, his gums became spongy and apt to bleed, and in other ways it became apparent that the continued action of the medicine was producing a debilitating effect upon his system. He had several times tried to do without his medicine, and wishing not to take it unnecessarily, had continued as much as a month at a time without sleep, excepting the short nap he got after six o'clock in the morning. It was with a view to ascertain whether any surgical relief could be afforded him, that, with Dr. Golding Bird's concurrence, he came to me in the summer of the year 1852.

The leg at this time presented a swelling over the centre of the tibia, evidently depending upon an enlargement of the bone, and about half way between this and the lower extremity of the tibia, was a second smaller projection, which could be distinguished only by passing the finger over its surface. Both these places were very tender to the touch, and the upper one presented at one point a sense of fluctuation, as though a small quantity of fluid were contained between the periosteum and the bone. The night after the leg was examined the pain was greatly increased, and he got no sleep at all.

When requested to point out the part where he suffered the most pain, he would pass his hand generally over the lower part of the tibia; and when asked to define the spot more precisely, he said that he had experienced as much pain as anywhere in the lower of the two enlargements. No one spot, however, could be selected as habitually more painful than the rest.

On the 27th of September, the patient having been rendered insensible with chloroform by Dr. Snow, a trephine, five-eighths of an inch in diameter, was applied over the centre of the larger projection about the middle of the tibia. The surface of the bone was here found to be soft, but its substance was hard as ivory, and it was with much difficulty that the trephine was made to perforate it. The original cavity of the bone was found to be occupied by dense bony structure, so that a cylinder of solid bone, an inch in depth, was removed without any cavity or cancellous structure being found. The centre of the portion of bone thus removed was found, when subsequently more carefully inspected, to be softened to a very limited extent.

A smaller trephine, three-eighths only of an inch in diameter, was then applied over the second projection lower down upon the tibia. The bone here was much softer, and before the instrument had penetrated half an inch, a small cavity was opened containing some thin brownish looking matter. This cavity was examined with a probe, and extended a little way up the centre of the bone.

The smaller trephine was now again applied about midway between the two former openings. The bone here was softer than in either of the other situations, and the instrument entered its substance readily. It had penetrated about three-fifths of an inch when a considerable quantity of reddish matter oozed up by its side, and the trephine entered a distinct cavity in the bone ; a probe introduced through the aperture passed up to the neighbourhood of the first opening made by the larger trephine. This was therefore enlarged, and a communication established between it and the opening last made. The cavity exposed by the second application of the trephine appeared not to communicate with the other. Had it done so, the matter would have passed through it, and not have been forced up by the side of the trephine when applied the third time. The two collections of matter, in all probability, corresponded to the two distinct injuries which the part had sustained.

For some days after the operation, the patient suffered severe pain in the leg, but nevertheless occasionally got some natural rest at night. On the 2nd of October he for the first time experienced an interval of complete ease. The pain, when it recurred, had now changed its character. It was rather an excessive smarting than the dull aching sensation formerly experienced.

On the 6th of October, the pain from which he had so long suffered had entirely subsided, but he complained of an increase of the smarting sensation upon the surface. He was directed to apply some flannel sprinkled with chloroform over the leg, but experienced little relief from its use. On the 7th he had some remission from the smarting pain, but it returned again on the 8th. On the 9th, he continued tolerably easy, but the pain again recurred on the following day. On the 11th, a fortnight after the operation, he was free from pain and slept well, although the parts were still tender to the touch. On the 19th and 21st of October he continued free from pain. After this the tenderness in the leg gradually disappeared, and he appeared to recover satisfactorily, but after a time the pain reappeared. The patient now, as he subsequently informed me, as a matter of convenience, placed himself under the care of a relative. A considerable time elapsed during which he was sometimes better sometimes worse. At length he consulted Sir Benjamin Brodie, who recommended him to take a pint of the simple decoction of sarsaparilla daily; under this treatment he completely recovered.

As the pain in this case commenced before, and continued after, there was reason to suspect any collection of matter in the bone, it could not have depended altogether upon the presence there of confined fluid. When once formed, the matter doubtless continued to maintain the irritation, but the pressure of the fluid, for the reason stated, could not have been the sole and immediate cause of the pain.

In cases where it is deemed advisable to perforate a bone, I have been led to prefer the use of a trephine of a very small diameter in the first instance. It answers the purpose of an exploring trochar in soft parts, and appears to me to possess the following additional advantages. A portion of bone is more quickly removed with a small than with a larger instrument, and the opening made requires less time to close subsequently. Should the first application of the small trephine not discover the disease, a second, or a third opening can be made without inconvenience. When once an aperture has been made into the bone, a flexible probe introduced and turned in different directions, will generally enable the surgeon to determine what further portion of bone, if any, should be removed. Portions of the affected bone are occasionally very hard, and it may happen that a small segment only of a comparatively large trephine may come upon the softened bone, the remainder of the sawing edge being firmly supported by the condensed and solid structure. The operator will then have no intimation, from the yielding of the softened tissue beneath the pressure of the instrument, of having arrived at the disease; and in instances where, as in the case last mentioned, a very small portion only of the bone is softened, the trephine may be worked deeper than is intended. Such an accident can rarely happen with a small trephine, with which the degrees of resistance of the different parts of the bone are very readily appreciated.

In determining where the instrument should first be applied, the most projecting point is to be selected as a rule. But this will not always be the part at which the matter, should there be any, will be found. The next best rule is to select the most sensitive spot for the operation ; but, as in Case I, there may be no spot peculiarly tender. Perhaps the best guide in such cases is a slight increase in the temperature of the skin, immediately over the seat of the disease, which may be detected by the touch in a certain proportion of cases. Should none of these indications determine the precise spot at which the instrument is to be applied, and should the swelling of the bone extend for some distance, the opening should be made in a dependent position.

The foregoing is a case having its origin in a strumous constitution, and perhaps dependent upon no other cause, except the accidental blows on the part. Notwithstanding the number of cases in which patients become affected with scrofulous disease of bones, it is very seldom that crude tubercle is found deposited in any quantity in their interior. The following case, for which I am indebted to Mr. Hewett, will, however, shew that when it does occur the symptoms will bear a certain resemblance to those of chronic abscess.

CASE III. *Crude Tubercle in Bone.*—A man was admitted into St. George's Hospital with a tumour situated at the union of the middle with the lower third of the thigh. This tumour was unyielding in its nature and not painful when handled. Fifteen months previously the patient had begun to suffer considerable pain in the bone, of a shooting character. This deprived him of rest at night. Three months afterwards, the swelling made its appearance and gradually increased in size; seven months from the time he was first attacked his health began to fail, and the pain in the thigh had, with few intermissions, been continual and of a severe character. The year following his first admission into the hospital, he was attacked with erysipelas, and died. On examining the thigh, great thickening and condensation were observed between the muscles and the bone. The periosteum, which was much thickened, presented on its free surface, a large patch of tubercular matter enveloped in a dense cyst. The bone itself was irregular in shape, much hypertrophied, and very hard. Its medullary cavity at this point was filled with tubercular matter, surrounded by gray semi-transparent lymph. Deposits of scrofulous matter were also found in other parts.

CASE IV. *Severe long-continued Pain. Disease of Bone. Excision at the Shoulder-joint.*—Emily D., æt. 16, fell and struck her arm in July, 1863. This was followed by swelling and pain. An abscess formed in the forearm, which remained open for four or five months. When the abscess closed, the arm, as she stated, became stiff. She now became an out-patient of St. George's, and was supposed to be suffering from an hysterical affection of the joint.

Motion of the joint, she said, gave her great pain; but it could be freely moved under chloroform. In November, 1864, fibrous anchylosis of the joint was found to have taken place. The patient being placed under chloroform, forcible extension was now employed. After a time an abscess formed, and when I first saw her a probe could be passed from a sinus at the back into the interior of the joint. The elbow was excised in June, 1866. She apparently progressed favourably until the 10th of July, when she complained of pain on the inside of the elbow. The surrounding skin was red and hot. On the 13th of July the wound was looking unhealthy; she complained of great pain, and had not slept during the night. 20th. Had shiverings for about four hours, and had passed a sleepless night. Pulse 134, and weak. 31st. Had a rigor for about five minutes last night. The symptoms generally were relieved. After a time she left the hospital, and was again admitted on the 26th of December. An unhealthy-looking wound then existed at the back of the arm, discharging offensive pus. She had occasional shiverings, followed by perspirations and diarrhœa. The pulse was small, and very quick. She lost flesh, and looked extremely ill. The discharge from the joint was discoloured and offensive. A variety of remedies were now tried, without success; the patient became weaker, and the nocturnal perspirations more decided. The pain in the part was extreme. At length, after consultation, the arm was amputated in January, 1867. It was now found that a very considerable quantity of new bone had been deposited around the extremities of the humerus and ulna. This extended for several inches, and enclosed a small portion of dead bone within the ulna. The operation was followed by relief of all the symptoms, and an excellent stump was formed. This, however, subsequently became extremely sensitive. She was sent to Seaford on the 4th of April, 1867. Upon her return the pain in the stump had increased. It appeared situated principally in the direction of the median and ulnar nerves, the extremities of which appeared enlarged. No satisfactory examination, however, could be made, on account of the extreme pain produced by handling the part. Every remedy, upon every plan which suggested itself, and the intermission of all remedies, were tried ; but still excessive pain in the part continued. This pain was quite real, as indicated by the sudden suffusion of the countenance when some particular parts were touched, and by her sleepless nights. I took the trouble to have it ascertained, by the periodical visits of nurses and house-surgeons, whether she really did sleep at night, and I found that the account she gave of her restlessness was perfectly correct. After some months, on the 6th of February, 1868, the pain continuing uninfluenced by treatment, the patient was placed under chloroform, and the median and ulnar nerves were dissected out. Their extremities were found to terminate in expanded white cartilaginous bulbs.

It was now thought that the disease would have been cured. The pain, however, recurred after a time, and was as severe as ever. The symptoms were very much a repetition of those formerly experienced, except that the pain in the stump was more general.

Once more, on the 24th of August, 1868, all the nerves, including the musculo-spiral, were divided close to the armpit. The patient's sufferings were again mitigated for a time, but again returned with all their former severity. It now appeared that the seat of pain was in the bone itself. The skin of the stump had lost much of its natural sensibility, and might be freely handled; but any pressure against the bone evidently caused acute pain. All kinds of remedies which were thought to be available were tried, and again without effect. The patient looked thin, weak, and dejected. At length, on the 8th of April, 1869, under the impression that the nerves of the bone were affected, and considering that the portion of the humerus which remained could be of little use to her, I proposed its removal. To this she consented, provided I would not remove any more of the soft parts; and accordingly one long incision was made on the outside of the shoulder and arm, and the bone was dissected out and removed from the glenoid cavity. The wound appeared to heal readily; the pain from which she had so long suffered was gone. She was sent to Margate on the 12th of June. In the middle of July an abscess burst. She returned to St. George's on the 10th of August quite free from pain in the part. The pain had not returned on November 16th, when I saw her.

The patient in this case was undoubtedly of an hysterical disposition. Her case bears a strong resemblance to those which have been described by Sir B. Brodie and Mr. Mayo, in which several operations were performed without any permanent alleviation of the patient's sufferings. In one case which I had an opportunity of seeing, Mr. Mayo performed several operations, and at length amputated the thigh at the hip-joint. The sufferings of the patient were temporarily relieved in this case after each operation; but were, I believe, ultimately removed by other means.

Sir B. Brodie has left us on record a caution, that we should not mistake cases of nervous affections for those of real local disease; and that it is equally important that we should not mistake the latter for the former. The cases which had come under his notice appeared quite conclusive against all attempts to relieve hysterical affections by an operation. With the soundness of this judgment we must all agree; but the point which I wish particularly to note in relation to these cases generally, and in reference particularly to the one which I have described, is this: viz., that it does not necessarily follow, because a patient is hysterical, that therefore there may not be some real disease which the hysterical disposition may aggravate and mask.

In the case which I have related, the abscess which formed in the joint, the small portion of dead bone in the ulna, and the deposit of new bone around the old, are sufficient proofs of real disease, whereas the recurrence and the character of the pain were similar to those observed in hysterical cases. My opinion was, that the real disease in this case localised perienced, except that the pain in the stump was more general.

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During the earlier part of the history of this case, the patient kept her arm in a semi-flexed position. Chloroform was administered to her, and then it was found that the arm could be moved freely. This at the time was thought to be conclusive of the hysterical nature of the case. Fibrous anchylosis and abscess in the joint, however, supervened. It is quite possible, therefore, that some disease may have existed in the joint from the first, sufficient to have given her pain on motion (aggravated perhaps by her hysterical condition), without being sufficient mechanically to impede the motions of the joint. Counting the occasions upon which forcible extension of the joint was practised before the patient came under my care, eleven operations altogether were performed before the patient was permanently relieved.

CASE V. *Embolism simulating Syphilis.*—An officer while returning from India by sea was suddenly prostrated. What the nature of the attack was, I had no means of learning with any accuracy.

Upon his arrival in England he had a tubercular eruption on his skin, which was supposed to be syphilitic, and for which he was accordingly treated. He had severe and long-continued pain in his bones, which became perceptibly enlarged in different places. After being under treatment for two or three months, one leg became suddenly very much swollen and extremely painful. This gradually subsided, and then as suddenly the opposite leg became affected in precisely the same way. There was extreme pain, swelling, and some redness of the skin, with very little œdema. This swelling also gradually disappeared, and the patient was thinking of leaving town, when the right eye suddenly became affected. It was supposed that this might be syphilitic iritis. There was inflammation of the choroid and iris, with deposit of lymph. The affection progressed steadily, apparently unaffected by any remedy. The sight was lost at a very early period. The eye protruded, and there was a strongly-marked lateral squint. Some leeches were ordered, and the day after an ecchymosed spot was observed beneath the conjunctiva. It was supposed by the friends that one of the leeches might have had something to do with this appearance, which I confess I looked upon with grave suspicion. After a few days several other dark spots appeared beneath the conjunctiva. These coalesced; and at length nearly the whole of the upper part of the tunica albuginea was covered by a black patch. Shortly after this the cornea became white, and ultimately sloughed.

It is unnecessary for me to go further into the details of this case. The termination of it left very little doubt in my mind that it was a case of embolism; and the interesting point in it is the great resemblance that the symptoms bore to those of syphilis. It is, of course, possible that embolism may have occurred in a syphilitic subject.

CASE VI. *Syphilitic pain in Bone.*—A widow lady had been suffering for years from rheumatism which had affected principally one hip. She had tried in vain all the usual remedies. Not knowing what else to prescribe, and thinking the symptoms might possibly depend upon some old constitutional disease, I ordered her a course of calomel-baths. Under this treatment she completely recovered. Some time afterwards I heard that her husband had suffered from syphilis. I select this case from among a large number, as I had an opportunity of ascertaining that the lady continued well some years after the treatment, and had then had no return of the pain.

Long-continued and recurring pain in bone, I have reason to believe, is not at all an uncommon symptom in those who have years previously suffered from constitutional disease. It is a symptom which frequently continues, year after year, without being attributed to its real cause. It was common in Shakespeare's day, and it is common now. In *Measure for Measure* he puts the question in the mouth of one of his characters, "which of your hips has the most profound sciatica?" under circumstances which leave little doubt as to the correct diagnosis of the disease. This subject will be more fully dwelt upon in a future lecture.

LECTURE XIX.

EXCISION OF JOINTS.

THERE are at present (November, 1869) in the hospital under my care two cases of excision, one of the knee the other of the head of the femur. I will briefly relate one of these cases, and then make some observations upon resection of joints generally.

CASE.—James Jones, æt. 34, was admitted on the 16th of June, 1869. For nine years he had suffered from a disease of the knee, and for two had been unable to use the limb. A sinus led into the joint on the outer side. He had come to town for the purpose of having the leg removed. Thinking it, for the reasons which I shall presently mention, a favourable case for excision of the joint, I recommended that operation, and performed it eight days after his admission into the hospital. The joint was found to be full of pus, the cartilages covering the extremity of the femur were much ulcerated, but the bone beyond was healthy. The cartilages of the tibia were still more diseased, and a cavity existed in the outer tuberosity which contained some pieces of dead bone; the cancellous structure here was much diseased and very soft. All the diseased portion was gouged out, with as little damage to the surrounding structure as possible. The limb was treated in the ordinary way.

Nine days after the operation the wound appeared in great part healed. The pulse was 80.

On the 3rd of September, bony union had taken place. He was free from pain. The leg was an inch and a half shorter than the other.

On the 28th of October, he was discharged to the convalescent hospital at Wimbledon, from whence he returned for a few days to the hospital. There is still a small sinus on the inside of the joint, from which a small amount of fluid occasionally escapes; but he can walk firmly without a stick.

In this case the patella was anchylosed to the femur. It was therefore sawn through transversely and the lower portion only removed. The upper part was left as an attachment for the extensor muscles of the thigh. In this way these muscles, when the patient recovered, lost none of their power of contraction with regard to length and leverage.

The operation of excision of the knee-joint as a substitute for amputation of the thigh was introduced by Sir W. Fergusson in 1850. It is true that the operation had in a very few exceptional cases been performed before, but it had never before been recommended as a rule of practice in cases of incurable disease of the knee joint. As might have been anticipated when first introduced, it was performed in some cases to which it was not adapted. Time and experience in fact are required, before it can be known with any degree of precision to what cases any operation when first introduced will be found applicable.

Excision of the knee-joint is not applicable as a rule to cases in which the disease has commenced in the shaft of a long bone, for the very obvious reason that the whole of the diseased parts cannot thereby be removed.

It is not applicable for the same reason as a rule to cases in which the disease originates in the synovial membrane.

The cases in which it is applicable are those in which the disease commences in the epiphyses of bones, or in the articular cartilages; and in such cases it is peculiarly adapted to those instances such as the one which I have related, in which the cancellous structure at the ends of the long bones has been consolidated by continued adhesive inflammation. The great danger to be apprehended after excision, as after amputation is, that the open cancellous structure of the injured bones may become infiltrated with the diseased secretions of the part, or that a low form of inflammation may extend along the internal periosteum.

The free communication which exists between different parts of the cancellous structure of a bone may be illustrated by a very simple experiment. If a small hole be bored in the sides of an adult bone, and water be injected, it will without difficulty permeate the whole of its interior; or, if the experiment be performed upon the bone of a younger animal (up to the time at which it attains its full development), the whole of the shaft will be injected, but none of the injection will penetrate to the epiphyses. In like manner, diseased fluids, when they escape into the cancellous structure of bone, beyond the limit prescribed by the adhesive inflammation, are confined only by the dense osseous parietes, or by the junction of the epiphysis with the shaft.

This line of separation is of much importance with regard to excision of the knee-joint. Up to the age of seventeen, and perhaps later, the epiphyses of the femur and tibia remain separate from the shafts of those bones.

Excision of the knee-joint may, therefore, be performed in children without interfering with any other portions of the bone ; this is no doubt one great reason why the operation is so much more successful in children than in adults. And in adults, when the extremities of the bones have been consolidated, as in the case which I have related, one source of danger is to a certain extent obviated.

The success which has attended the operation of excision of the knee, naturally led to a reconsideration of the subject of resection as applied to other joints. Up to that time cases of diseases of the hip involving destruction of the cartilages were treated with counter-irritation and rest, in the hope that anchylosis would in time take place. When this did not occur the surgeon had no other resource, and the history of the cases was but too often recorded in the specimens with which our museums abound. Under certain exceptional circumstances, indeed, surgical operation was had recourse to, but this could not be said to form any part of the recognised mode of treating disease of the hip-joint. The great authority upon diseases of the joints, at the period to which I allude, says, "In an old case of diseased hip-joint the head of the femur may sometimes be felt lying on the dorsum of the ilium, and, in consequence of the general emaciation of the patient and the wasting of the muscles, with so little soft parts over it that it seems to be almost immediately beneath the common integuments. In such a case it has been proposed to make an incision on it and remove the head and neck of the femur by a saw. It would appear that this operation has been actually performed with some degree of advantage, and I do not doubt that circumstances may occur to make it worth while to have recourse to it. But it is to be observed, at the same time, that all that can be thus accomplished is the removal of one portion of the disease, and that it is the largest portion of it, in the bone of the pelvis, which is necessarily allowed to remain. The operation cannot be performed without a certain degree of local disturbance, and more or less loss of blood; and taking all those things into consideration, I conceive that we should not recommend it except where some very unequivocal advantage may be expected from it."*

Now, it is evident from this passage that very few surgeons, previous to the period I have mentioned, thought of excision as a means of treating disease of the hip-joint, and that still fewer ever practised it.

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* Sir B. Brodie's works, p. 210.

The instances that occurred in which anchylosis could not take place, as was generally the case when the disease involved a portion of dead bone, were, as a rule, confined to bed for the remainder of their days.

In similar cases of disease of the knee-joint the surgeon had a resource in amputation—a severe measure, involving the loss of the leg and knee, and not unattended with danger—a measure so severe that it was often delayed until the constitution of the patient was irretrievably damaged.

It became, then, a question of the highest surgical interest to know whether the excision of a joint is, as a rule, more or less dangerous than amputation, and whether the limb that was left after such an operation is more adapted to the patient's wants than some mechanical contrivance would be.

With regard to the cases of disease of the knee-joint, it must be premised that in no case was resection of the joint proposed where it was thought that there was any chance of preserving a limb which would ever be of use to the patient. It is true that on some occasions there is less objection to resection on the part of the patients or their relatives, than to amputation, and therefore the former operation may sometimes be done at an earlier period than the latter. This, no doubt, may be a circumstance which tells in statistical tables in favour of excision, but it is one of the advantages incident to the mode of treatment; any numerical comparison with regard to the treatment of diseased joints by excision should therefore be between excision and amputation, and not between excision and any other mode of treatment.

The following tables show the results of cases which have fallen under my care, in which the operations of excision of the hip, knee, and elbow, have been performed.

TABLE I.—*Four cases of excision of the head of the femur.*

No.	Name.	Age.	Date of Operation.	Observations.
1	Henry Cresswell	14	July 6, 1865	Left the hospital at the expiration of seventy days. The pelvis was somewhat twisted. Limb two inches shorter than the other; still slight discharge from the wound. Has not been heard of since.
2	Edward Disney	8	Jan. 18, 1866	Discharged from hospital July 4th, 1866. The head of the bone and the great trochanter were both much diseased in this case. The neck of the femur contained a portion of dead bone. The portions of bone removed were placed in maceration, but crumbled away in great measure in the process. The head of the bone is, however, partially preserved. This patient recovered with a perfectly useful and moveable joint. In the summer of 1868 he walked from Whitechapel to London Bridge, and from Hungerford Market to St. George's Hospital, to show himself, and seemed to think nothing of having to walk the same distances home again.
3	Eliza Castle	14	June 6, 1867	In this case the acetabulum was diseased as well as the head of the femur. Portions of the carious acetabulum were removed at the time of the operation. The head of the femur was carious, and the cartilage that remained was almost entirely detached from it. The neck of the femur contained a small portion of necrosed and separated bone. On the 29th of July a small piece of bone came away, and on the 6th of November she was sent to Margate; some other very small pieces of bone came away during the summer of 1868. In August of the same year a very small sinus was left. She experienced no pain or inconvenience, but could not bear her whole weight on the limb. The limb was two inches shorter than the other, but the heel of the affected side came fairly to the ground, the difference of length between the two legs being compensated by a twist in the pelvis.
4	Annie Lee	7	Sept. 23, 1869	The head of the femur was eaten away to about half its natural size. Portions of the diseased acetabulum were removed with the gouge. Health much improved after operation; wound nearly healed, Dec. 1869.

TABLE II.—*Thirteen cases of excision of the knee.*

1	Harriet Audrie	7	June 30, 1860	This patient was in St. George's, Ormond Street, and King's College Hospitals. There was some necrosed bone in the head of the tibia. In October the wound made by the operation was nearly healed, and on the 3rd of November she was discharged from the hospital. The last note of the case says, "The leg was of good length compared with the other."
2	Benjamin Benn	8	April 23, 1863	An abscess was found in the internal condyle of the femur. Left the hospital July 1st, 1863. The wound was then quite healed, and the bones anchylosed. He came to the hospital to show himself on the 22nd December, 1863. He could then walk and run with facility. The leg was about an inch shorter than the opposite one.
3	Patrick Rhyle	24	Nov. 24, 1864	Abscess and necrosed bone in head of tibia. Left the hospital March 1st, 1865. Could walk with crutches; a severe attack of rheumatism delayed his recovery.
4	Charles New	11	Dec. 14, 1865	Operation for strumous disease. Discharged May 22nd, 1866. Firm union; limb nearly two inches shorter than the other.
5	Henry Newton	13	Jan. 18, 1866	Periostitis of lower end of femur, causing great swelling; abscess in joint. Discharged July 11th, 1866.
6	Richard Pratt	15	Aug. 30, 1866	Old abscesses; dislocation and anchylosis of knee; wound affected with phagedæna October 1st. Discharged March 11th, 1867. Wound almost healed; got about well with the assistance of crutches.
7	Edward Kemmins	7	March 14, 1867	Strumous abscess in knee-joint. Immediate relief of pain by operation; no constitutional disturbance and very little local action followed operation. Sent to Margate May 16th. Readmitted with very moveable joint in 1868, when the soft fibrous tissues between the ends of the bone were removed by operation without producing any constitutional disturbance.

TABLE II.—*continued.*

No.	Name.	Age.	Date of Operation.	Observations.
8	William Chapman	21	April 4, 1867	Strumous disease of knee. Died April 24th. The extremities of the bones were found softened. The cancellous structure of the femur in a state of diffuse osteo-myelitis. The femoral vein contained some broken-down coagula, but the lining membrane was quite smooth. There were incipient secondary deposits in the right lung. The liver was fatty, the spleen pulpy, and the kidneys congested.
9	Luther Watson	4	May 15, 1867	Abscess in lower extremity of femur, communicating with knee-joint. Discharged October 19th.
10	Anthony Bachelor	9	June 6, 1867	Strumous disease. Discharged October 2nd, 1867. Wound healed; union firm; limb 1¼ inch shorter than the opposite one.
11	Stephen Ring	12	Dec. 14, 1867	Strumous disease; abscess of femur opening into knee-joint. The knee had been bent at an acute angle since he was two years of age. A letter from the boy's father mentions that at that time Professor Syme said, "it would be far better to have it taken off." The limb had never been developed. Some years ago he had an accident and broke the femur, which was allowed to unite with the ends overlapping, and at an angle. The wound made in the excision healed in great part by first intention. He was discharged January 17th, 1868. A small sequestrum of bone was removed from the anterior edge of the tibia in June, 1868. Both before and after this he could walk firmly and without assistance by means of a peg attached to the bottom of a lace-boot. Shortening from the various causes mentioned, 5½ inches.
12	Caroline Blakeley	5	Aug. 27, 1868	Contracted and partial dislocation of the knee. Strumous disease of ends of bone; ulceration of cartilages. Died September 12th. Purulent infiltration of the remains of the epiphyses and also of the shafts of the tibia and femur; old scrofulous deposit in lung: minute tubercular deposits in the fissure of Sylvius on each side at the base of the brain.
13	James Toms	34	June 24, 1869	Knee had been diseased nine years; upper half of the patulla left anchylosed to femur. Left the hospital ultimately, able to walk firmly without a stick, December 8, 1869.

TABLE III.—*Four cases of excision of elbow.*

1	Kate Wood	15	Aug. 27, 1863	Strumous disease. The extremities of the humerus, radius and ulna, were removed; some small pieces of bone subsequently exfoliated; regained excellent use of her arm; when her sleeve was down a stranger would not know that anything had been done. Last seen with very perfect use of her arm in June, 1868.
2	Thomas Offer	13	Sep. 20, 1864	Primary excision; accident caused by the bursting of a gun; very favourable recovery; free flexion and extension November 9th, 1864.
3	Walter Walder	36	Aug. 17, 1864	Abscess in joint following injury; the wound was healed November 30th, when he was discharged; could flex and extend the limb; a sinus subsequently formed, through which some exposed bone could be felt.
4	Emily Duffin	20	June 7, 1866	Abscess in joint; anchylosed in nearly a straight position; made apparently a good recovery, but subsequently attacked with most severe and long-continued pain in the humerus. After a long delay, and when it appeared that she was becoming exhausted, the arm was, with much reluctance, amputated; very perfect fibrous union had taken place in the joint. A small piece of detached dead bone was found in the ulna, and a considerable quantity of new bone was found deposited on the surface of both the ulna and humerus.

These tables do not include two cases in which an operation was commenced as if for resection, and completed by immediate amputation. The bones in these two cases were known to be extensively diseased, and the operation was undertaken with the understanding that, if the disease extended beyond the limits which would justify resection, amputation should be performed. One of these was a case of old disease of the hip, with an abscess in the joint extending through the acetabulum half way to the umbilicus. The other was an instance of abscess in the knee-joint in which the tibia proved to be extensively involved. Both these cases recovered in a very satisfactory manner.

In two of the above cases mentioned in Table I the head of the bone was dislocated from the acetabulum. In the other two, and also in that in which amputation was performed, the head of the bone was in its natural position. In none of the cases was there any inconvenient amount of hæmorrhage. In the third case, distinct crepitus could be felt on moving the joint before the patient experienced any great amount of pain. Previous to the operation, however, the pain became exceedingly severe. This led to the idea, after it was found that the cartilage was in a great measure detached from the head of the femur, that the pain had resulted, not from simple ulceration of the cartilage, which must have occurred before the crepitus would have been felt, but from the slight attachment of the cartilage to the layer of bone beneath. When the cartilage is thus in great measure detached it may easily be conceived how a very slight motion would tend to detach it farther and how much pain this would occasion. This case is the first, as far as I know, in which resection of the head of the femur has been performed where there has been no abscess in the joint and no external opening. The immediate cessation of the suffering of the patient appeared amply to justify the operation, and the existence of a portion of dead bone in the neck of the femur showed that she could not have recovered by any other means. The subsequent history of the case proved that excision of the head of the thigh bone may afford the opportunity for necrosed portions of a diseased acetabulum to escape, which otherwise would remain permanently locked up, so that, although the whole of the disease as regards the acetabulum may not be removed at the time, the patient has a better chance of recovery even with regard to this part of the disease than without an operation.

In performing the operation of resection of the head of the thigh bone, when that is not dislocated, it is not sufficient to divide the capsular ligament in a circular direction. If this only is done, as may be proved by operating upon the dead subject, there may be considerable difficulty in getting the head of the bone out of its socket. The plan which I have adopted is first to make a longitudinal incision parallel to the neck of the femur and extending through its whole length. The knife may then be introduced between the neck of the bone and the capsule. This may easily be divided in front and behind the bone, so as to leave in it a crucial incision, and the head of the bone may then easily be dislocated.

In several of the cases included in the foregoing tables the cancellous structure of the bone had been consolidated by chronic inflammation, produced either by the presence of portions of dead bone or by chronic abscesses in the extremities of the bones.

One case of excision of the elbow (No. IV) was followed after some lapse of time by amputation of the arm; very perfect fibrous anchylosis had, however, taken place, and the amputation was performed for an affection of the shaft of the bone of the arm, and not for any disease in the joint. In another case (No. I.) of excision of the elbow a crude tubercle was found in the extremity of the humerus. This disease was described by Sir Benjamin Brodie, who has left some very beautiful drawings in illustration of it. It has, however, very seldom been mentioned by other surgeons as having been seen in post-mortem examinations.

The records of the Medical Society of Observation, instituted some years ago for the purpose of making a return of the results of different operations in the various London hospitals, furnish a list of 186 amputations from all causes. Of these, 69 died. Out of this number there were 10 in which amputation was performed for chronic disease of the knee in patients of sixteen years of age and under. Of these, one died at the end of thirty days, and another on the eleventh day. The numbers given here are not large, but may, perhaps, be taken as the average mortality after amputations in London hospitals, and with these the results of resection of joints in the foregoing table may be favourably compared. Out of 24 cases in which I have now performed excision of the larger joints, two only have terminated fatally.

END OF VOL. I.

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